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CITY COUNTY STATE

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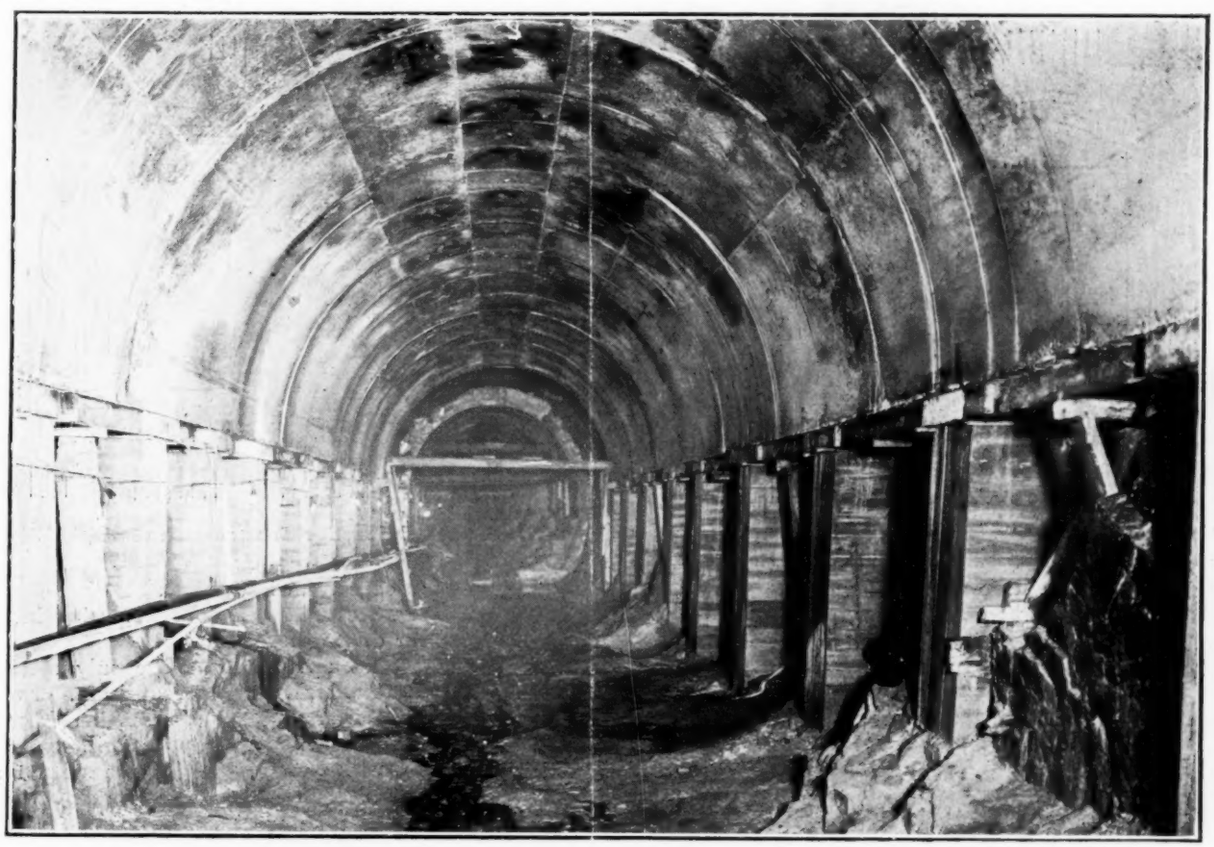


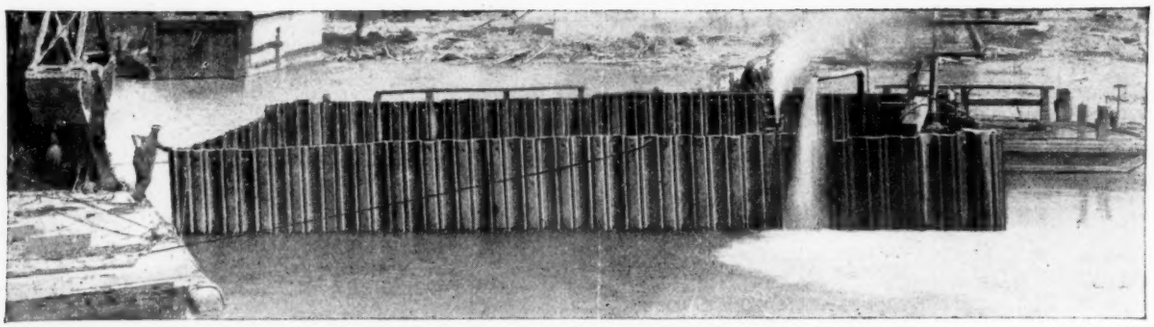
SIXTIETH STREET TUNNEL, UNDER QUEENSBOROUGH BRIDGE APPROACH

Arch Lining Supported on Pilasters to Increase Clearance for Construction Operations Adjacent to Bulkhead at End of Subaqueous Section. Pilasters Subsequently Enclosed in Side Walls.
The construction of this tunnel will be described in next week's issue.

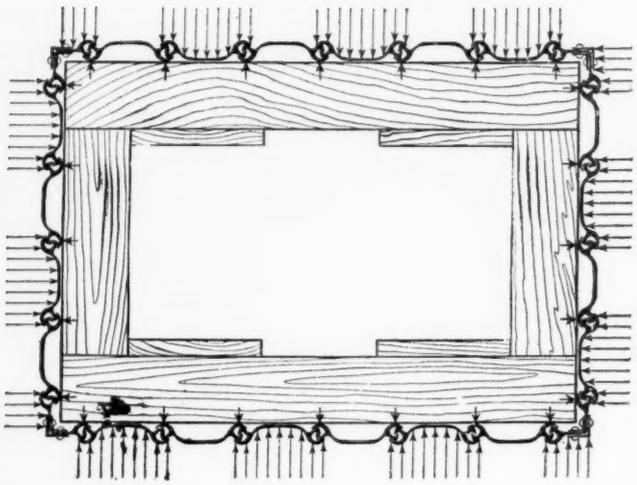
IN THIS ISSUE

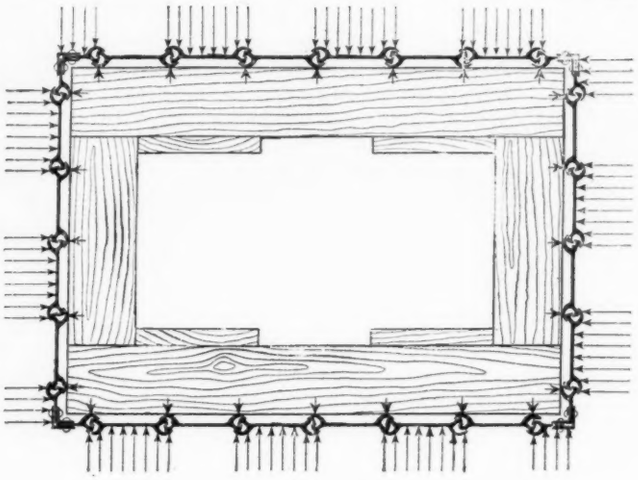
Building a Concrete Roadway in Halves
Cost of Construction Accidents
Georgia's Highway System
Report on Milwaukee Water Supply
Constructing Water Supply Works of Winnipeg
Excavating by Power under a Building
Index of the July Periodicals

AUGUST 21, 1920



The Theory of Watertightness of Lackawanna Steel Sheet Piling





Water pressure tightens the cofferdam.
Alternate Steel Sheet Piles are in direct contact with bracing at both fingers (or flanges).
Intermediate Steel Sheet Piles are acted upon by outside pressures during unwatering, forcing them into direct contact on two lines in each interlock.
A small amount of cinders, when cofferdam is under pressure, will close any spurt or leak at the interlocked joints between the sheet piling sections.

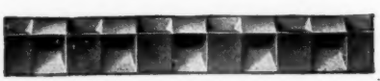
Recommendations for Construction of Single-Wall Steel Sheet Piling Cofferdams:

Sink bracing in cage form if possible.
Assemble Steel Sheet Piling if possible, using bracing as assembling or driving forms.
Fill, but do not pack interlocks. Use only materials that will crush (cinders), or sweel (wheat). Do not splice Steel Sheel Piling unless construction demands. but if splicing is necessary burlap or canvas blanket washers applied with hot tar on pressure side of pile should be used at the splices.

We Also Offer for Better Construction

Elcannes

Concrete Reinforcing Bars



The Elcannes Bar combines maximum bonding surface, minimum weight, and uniform strength. The bonding surface is 15 per cent greater than that of a plan square bar of equal nominal size. The cross-sectional area is practically the same at all points and the regular surface facilitates fabrication and handling.

Lackawanna Steel Company

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389-E

PUBLIC WORKS.

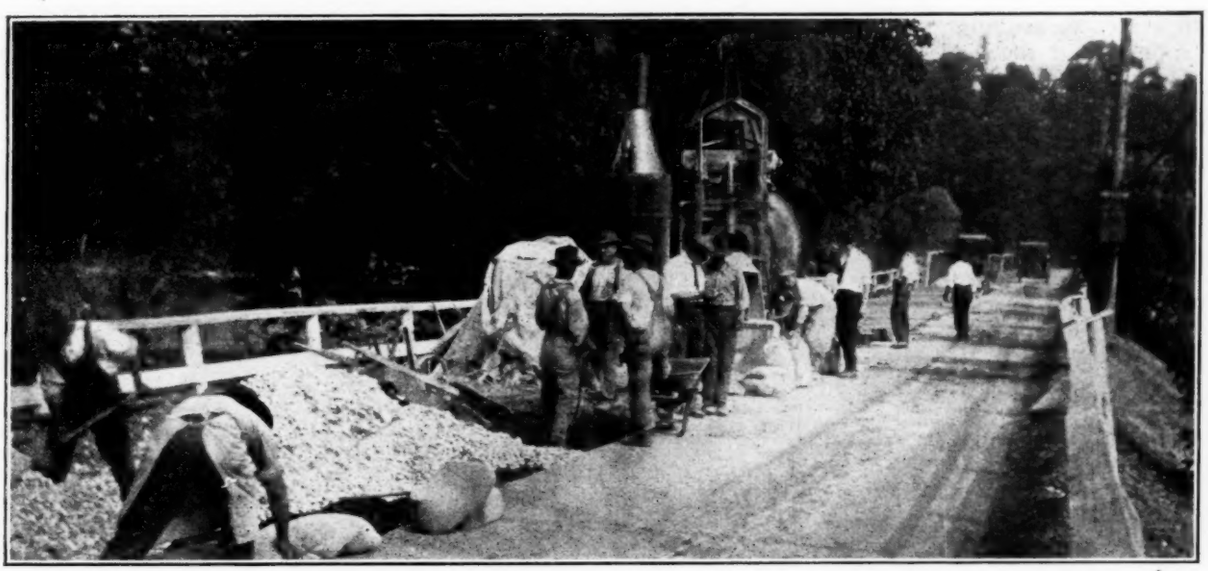
CITY COUNTY STATE

A Combination of "MUNICIPAL JOURNAL" and "CONTRACTING"

Vol. 49 FLORAL PARK, AUGUST 21, 1920 No. 8

Building a Concrete Roadway in Halves

Heavy travel has been maintained continuously on a New York State Highway while a concrete pavement has been constructed which occupies the complete width of the embankment.



CONSTRUCTING THE SECOND HALF OF A CONCRETE PAVEMENT.

Note that the Pavement Extends to Within a Few Inches of the Fence and Traffic is Using the Finished Half of the Road.

To build a 20-foot concrete roadway on an embankment 22 feet wide and meantime keep the road open for a traffic of 4,500 or 5,000 automobiles a day, a considerable part of which pass during the night, was the problem which confronted the State Highway officials of District No. 1, New York State, and the contractor to whom the work was let, Louis Petrillo.

The work referred to was a section about a quarter of a mile long which formed a part of a contract of considerably greater length, being a point where the Post Road between New York and Albany crosses a low, swampy place on an embankment about 10 feet high in the town of Harmon. This road gets practically all of the traffic between New York and all Hudson river points, and much of that from New York to the Berkshires and other New England points. A part of this traffic consists of motor trucks of all weights up to the heaviest permitted by the state law, which is 25,000 pounds, and undoubtedly some infringements of the law exceeding this limit.

No detour which would be practicable for the heavy trucks was available except one which would add about 12 miles to the distance, and it was therefore decided to endeavor to maintain traffic over the road in question during construction, and this was made a provision of the contract. This necessitated the building of the road in two longitudinal halves, traffic being carried on one half while the other was under construction.

The road was designed as a concrete pavement 20 feet wide, 8 inches thick in the center and 7 inches at the sides. This was one of last year's contracts and did not call for reinforcement, as do all of the contracts being let in 1920. The road was an old macadam one and, with the shoulders, gave sufficient width, when one half was torn up for the construction of the concrete pavement, to permit traffic to pass on the other half if care was used.

The exception to this was the embankment referred to, which was only 22 or 23 feet wide on top between the fences which lined the two

sides. When one half had been torn up for laying the first strip of concrete, it was, of course, impracticable for two lines of traffic to pass on the other half, and the same was true after the first half of the concrete had been laid and during construction on the other half. It has therefore been necessary for the traffic to be strictly regulated, traffic in one direction across the embankment being held up while that in the other passed, then the second line was held up while those in the opposite direction passed through. It was found necessary to keep members of the State Police constantly on hand to regulate this traffic.

This regulation of the traffic by no means eliminated the contractor's difficulties. With only about a foot of road between the finished pavement and the fence, there was no room for the use of wheelbarrows and barely sufficient for the finishers to use float, belt, etc. As there was no room along the side of the road for piling the aggregate, the stone and sand were placed in alternate piles on the subgrade and these occupied the entire width of the half-road under construction. This left no room for a wheelbarrow run over the subgrade.

CONSTRUCTION OCCUPIES ENTIRE WIDTH OF EMBANKMENT

The piles of stone and sand were alternated, so that it was necessary that one of these be carried from the pile to the mixer by a wheelbarrow or other method. The strip being something less than a quarter of a mile long, the contractor did not think it worth while to install any special contrivances for meeting this difficulty, but is relying entirely upon wheelbarrow and shovel for handling the aggregate.

The first half strip was finished early last winter, and the other side is now under construction. The contractor began work on the second half of the embankment on Monday, July 19th (on which date the work was visited by the writer) and over 200 feet was completed that day and it was anticipated that between 200 and 250 feet a day could be maintained as the rate of construction.

The broken stone had all been deposited in piles along the subgrade before the contractor began on this strip. The sand is obtained from a bank only a short distance from the work, and only a few piles are maintained ahead of the mixer. The piles are spaced a distance apart equal to the length of pavement that can be laid from one position of the mixer. When the concrete has been laid as close as possible to the mixer, this is moved until the skip is close to the next pile of aggregate. The sand or stone, as the case may be, (whichever material is nearest the mixer) is shoveled into the skip, and the other aggregate is brought to the mixer in wheelbarrows which have to pass over only the few feet separating the piles of aggregate, the traffic being held up for the 15 to 30 seconds necessary for this. Except for this, the traffic is not held up and is practically continuous throughout the day.

The concrete is mixed with a Foote batch mixer, which discharges it on the subgrade by means of a sectional chute. Seven men are used getting the sand and stone into the skip and adding the cement. An engineer runs the mixer, and four men on the wet end of the mixer distribute the concrete and finish the surface. For the latter purpose they use first a wooden screed, which is followed by a roller, this by a thin board, and the final surface is given by use of a belt. In the use of these finishing appliances it is, of course, necessary for one man to stand on the completed pavement, but by keeping close to the edge of this there is room between him and the fence for traffic to pass. Not all drivers are as careful as they should be, and there is some danger attached to this work and occasionally one of the men is struck by the wheel guards, although so far no serious injuries have occurred. In addition to the seven men on the dry end and four men on the wet end of the mixer and the engineer, there is one man dressing the grade after the aggregate has been removed from it and before the concrete is placed. These thirteen men, with the foreman and water boy, constitute the gang.

The same plan of constructing the pavement in 10-foot strips has been adopted for all of this contract. The difficulties for contractor and highway department, as well as the inconvenience to traffic, are not so great over the wider parts of the road; but, even taking the contract as a whole, the engineers of the highway department find so many objectionable features connected with the plan that they probably will not adopt it for any future construction if it is possible to locate detours.

The work is being done under the supervision of J. B. Egbert, county assistant engineer. The division engineer for this division of the state highway system is James H. Sturdevant, with headquarters at Poughkeepsie.

Limiting Truck Loads

The City of St. Louis has passed an ordinance prohibiting the excessive loading of trucks and providing fines of from $5 to $500 for violations of the ordinance. A maximum total load of 28,000 pounds, a maximum axle load of 22,400 pounds, and a maximum load of 800 pounds per inch width of tire are prescribed. Permits may, however, be secured under certain conditions for the transportation of loads in excess of these amounts to be hauled over certain specified routes.

Traffic on Pennsylvania Highways

A traffic census was taken on sections of the Lincoln Highway and the William Penn Highway in Pennsylvania on July 25th and 26th, traffic being counted at ten points on the former and at three points on the latter

The heaviest traffic was found in Chester county on the Lincoln Highway, where 3,877 passenger cars and 82 trucks were counted on Sunday, July 25th, and 2,301 passenger cars and 1,013 trucks on the following day. There were also 125 motorcycles and 33 teams on Sunday and 43 motorcycles and 74 teams on Monday.

On the William Penn Highway the heaviest traffic was found on the section between Bethlehem and Easton. On Sunday, July 25th, 3,243 passenger cars and 75 trucks were counted, and on the following day 1,002 passenger cars and 270 trucks. In addition there were 159 motorcycles and 8 teams on Sunday and 60 motorcycles and 25 teams on Monday.

One section of the William Penn Highway had been oiled several days prior to July 25th and the traffic therefore was not so heavy as ordinarily on this section.

The heaviest team traffic counted was between Philadelphia and Morrisville, where 117 teams were counted on Monday and 54 on Sunday. This strip also gave the highest count of motorcycles, there being 343 during the two days. Here also was by far the heaviest truck traffic, 265 being counted on Sunday and 546 on Monday. The passenger cars on this strip were 2,467 on Sunday and 922 on Monday.

Of the several sections on which census counts were made, that showing the least travel was the Lincoln Highway between the town of Bedford and the Fulton county line. On Sunday the count here was 690 passenger cars, 51 trucks, 28 motor cycles and 17 teams; and on Monday there were 285 passenger cars, 101 trucks, 11 motor cycles and 47 teams. This gave a total of 1,230 for the two days, as compared with 7,554 on the same highway between Coatesville and Downington.

The total of all kinds of vehicles counted on both days at ten points on the Lincoln Highway was 32,531, or an average of 3,252 at each point. On three sections of the William Penn Highway the total counted was 8,077, or an average of 2,692 at each point. The count at all thirteen points on the two days showed a total of 34,165 passenger cars, 3,780 trucks, 1,863 motorcycles and 800 teams.

Army Convoy Over Bankhead Highway

A convoy of sixty-five motor vehicles left Washington on June 14th over the Bankhead Highway and expects to reach Los Angeles on September 17. The object is to demonstrate the practicability of the motor truck for transcontinental service, to obtain data on highway and bridge construction and topography for military purposes, to call attention to the need of transcontinental highways, and to stimulate army recruiting.

The train comprises a motor transport company containing a Dodge touring car, Dodge delivery truck, five White 1½-ton cargo, eight Garford 1½-ton cargo, eight Packard 1½-ton cargo, four Standardized B" cargo, two F W D cargo, one kitchen trailer and two motorcycles. There is also a service park unit consisting of a Dodge touring car, two White 1½-ton machine-shop trucks, one Dodge light delivery truck, two White 1½-ton cargo trucks and one Cleveland tractor. The headquarters command will occupy two Cadillac touring cars, three Dodge touring cars, two White staff observation cars, one G M C ambulance and four motorcycles.

The Government hopes to duplicate along this highway the educational and other advantages secured by a similar convoy sent last summer over the Lincoln Highway.

Georgia's Highway System

The state legislature of Georgia last year passed a bill providing for the reorganization of the state highway department and directing the state highway engineer to select and prepare a map of a system of state roads that would connect each county seat of the state to the neighboring county seats, at least two such roads reaching each county seat, and also provide for interstate connection; the total milage was to be limited to 4,800 miles. Such a map has been prepared by the state engineer, W. R. Neel, and is shown in the accompanying illustration.

In order to provide the cost of constructing

PROPOSED GEORGIA ROAD SYSTEM

this system, the license fees for motor vehicles were increased and the funds are to be used exclusively for the construction and maintenance of the state system, to which will be added the federal aid funds. The law provides that at least 70 per cent of the funds so obtained shall be expended in actual paving work. The state has been divided into twelve districts with a division engineer in charge of each, each of these engineers being a carefully selected man with highway engineering experience. The organization is now practically completed and is working smoothly.

Advisory Transportation Engineering Committee of Interstate Tunnel Commission

Discussion of width of roadway, kinds of vehicles that will use tunnel, kinds of materials that will be hauled, legislation and other problems.

A meeting of the above committee was held on July 8th at the Automobile Club of America, 247 West 54th Street, which was presided over by H. J. Moran, Engineering Department, of the International Motor Company. The object of this committee is to offer constructive criticism and to make recommendations to the chief engineer as to what the proper width of roadway should be to safely operate the maximum amount of motor vehicle traffic through this proposed tunnel between New York and New Jersey. This committee is composed of representative engineers having actual road transportation experience. There are six members representing the motor truck interests and also a member from the allied trucking interests—H. J. Moran, chairman, representing the International Motor Company.

A short talk was delivered on the tunnel proposition by Mr. Clifford M. Holland, chief engineer of the Tunnel Commission; there was considerable discussion as to what the minimum width of roadway should be for the safe operation of two lines of vehicles going in the same direction. Finally, a motion was made and carried, the question held over until the next meeting.

It was the consensus of opinion that semi-trailers, commonly called "tractor-trailers," would come into general use in the next few years, especially so inasmuch as the connecting link between the two states would tend to develop this end of the motor vehicle industry.

The following vehicular tunnel data were announced for discussion by the Advisory Transportation Engineering Committee:

1. What should minimum width of roadway be?
2. Is it necessary to make practical road test with several motor trucks loaded, at various speeds as 3, 5, 7, 10, 12, 15-miles per hour, running trucks in two lines three or four deep and properly spaced with roadway each side of truck covered with whiting or some other substance that will show wheel tracks? Probably a 500 ft. wooden model should be built to determine this.
3. Traffic that would predominate in use of tunnel—motor trucks. The hundreds of freight cars of materials that are lightered into New York City daily will be transported through this tunnel via truck.
4. Limitations of tunnel engineers—economic standpoint, first cost, carrying charges, maintenance. (Width of tunnel governs this).
5. Character of truck payloads of today and loads of the future.
6. Truck limitations of today (by law) and laws of the future.
7. The known fact that 90 per cent of trucks in service today are under-powered, overloaded, and wheels out of alignment.
8. Minimum width of road for vehicle of today (8 feet now allowed). Careful consideration of future legislation in favor of wider vehicles possibly 9 feet or 8 feet 6 inches over hubs.
9. Possible movement from time to time of War Dept. motor vehicle equipment, as portable kitchens, welding shops, machine, blacksmith, printing, portable camp lighting and searchlight equipment.
10. Possible legislation favorable to tractors which may five years from now be permitted to transport 15 to 20-ton loads.
11. Possible necessity of transporting via motor truck from within radius of 250-miles of New York merchandise, machinery, food and general materials urgently required for loading at seaboard.
12. Possibility of bringing into N. Y. fabricacted steel, concrete aggregate, cement, etc., for buildings as well as the influx that will result from new industries that will be built up on the Jersey meadows.
13. Possible elimination of street car lines and future motor bus lines running from possibly 14th Street to Jersey and Hoboken through tunnel.
14. Disabled and broken down trucks, possibility of broken axle, bearing, wheel, collision, etc., to cause all traffic to be blocked. Possibly dollies and heavy jacks should be stored at frequent intervals.
15. An electric signalling system with traffic officers to be located.
16. Space allowance possibly under recess in walls to store emergency apparatus which will enable mechanics to get disabled vehicle to one side.
17. Roadway not to have crown.
18. Possibility of legislation favorable to trailers for which pneumatic brakes, etc., may be adopted.
19. Collection of Tolls.

Report on Milwaukee's Water Supply

Experiments extending over twelve months were conducted to try out certain features of rapid sand filtration of the lake water and determine which would give best results with greatest economy. The water was clear but fairly high in bacteria and especially in certain algae.

A few weeks ago Jos. W. Ellms submitted a report to the commissioner of public works of Milwaukee, Wis., giving a description of and his conclusions from a series of experiments on the purification of that city's water supply. On March 25, 1918, the common council of Milwaukee directed the commissioner of public works to "carry on experiments in water filtration and other methods of purifying the city's water supply, and to purchase the necessary tanks, apparatus, machinery, chemicals and other supplies, materials and equipment which he deems necessary therefor;" provision being made for the employment of a consulting engineer to construct the experimental plant and supervise the investigation. The commissioner employed Mr. Ellms for this work.

A plant was constructed, including the building for housing it, and regular operation of the plant for experimental purposes was begun on February 1, 1919. In his report Mr. Ellms divides the operation of the plant into forty-seven periods of various lengths in order to try out different details of plant and of operation. Over 100 different combinations of mixing devices, settling tank and filters, operating at varying rates of flow, were outlined, but only those lines of investigation were selected which would most quickly establish the more important facts to be determined. The experiments were continued until January 24, 1920.

The general line of investigation followed is summarized by Mr. Ellms as follows:

1. To study the physical, chemical and bacteriological characteristics of the water supply of Milwaukee as obtained from Lake Michigan.

2. To observe the general effect of seasonal and other changes in the character of the raw lake water, and their relation to the purification processes studied.

3. To study the efficiency of rapid sand filtration as a method of purification:

a. To investigate methods of mixing chemicals with the water to be treated in order to produce maximum coagulative effects in the minimum space of time.

b. To ascertain the shortest effective periods of sedimentation.

c. To determine the highest rates of filtration consistent with a proper degree of clarification and bacterial removal.

d. To study the effect of a modification of a common type of filter strainer system on the filtering and washing processes.

4. To study the efficiency and applicability of ozone as a disinfecting agent for both raw and filtered water.

5. To make any necessary studies on disinfection with chlorine for determining its efficiency under local conditions and for comparison with disinfection by ozone.

The subject matter of the experimental work described in the report was for convenience divided into five main sections:

1. Quality of Lake Michigan water.
2. Filtration as a method of purifying the water supply.
3. Quality of the filtered water.
4. Disinfection as a method of purification.
5. Conclusions and recommendations.

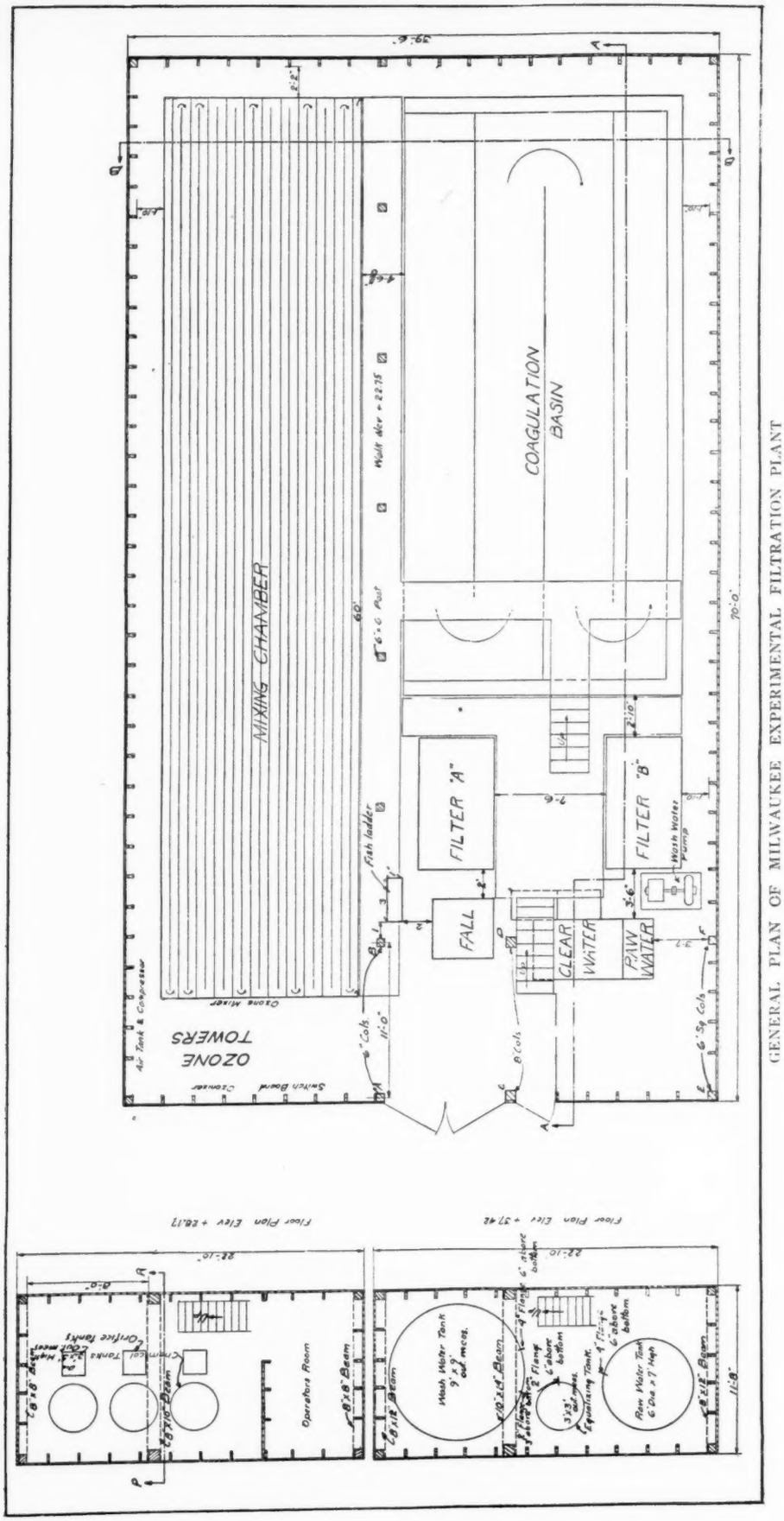
As a part of the report there were submitted five appendices covering the following subjects:

1. Description of experimental filtration plant.
2. Description of experimental ozone disinfection plant.
3. A detailed record of the filter plant operation periods.
4. Special laboratory investigations
5. Tables of averaged data.

Experiments were made on rapid sand filtration, using both alum and also iron and lime as coagulants; and ozone as a sterilizing agent.

The plant was housed in a frame building 70 feet x 39.5 feet and 12 feet high, with a tower 40 feet high in one corner. The tower contained raw and filtered-water head tanks, a wash-water tank, and three chemical solution tanks with their orifice boxes. The main part of the building contained various mixing devices, a settling tank, two filters, and the ozone apparatus. The filtration plant had a capacity of about 300,000 gallons per day, and the ozone disinfecting plant a capacity of about 8,000 to 9,000 gallons per day.

For mixing the coagulating solutions and the raw water, four different types of apparatus were used —mixing channels, a fish ladder, a "fall," and a "flume." The first consisted of a tank provided with baffles of "around the end" type, which was 60 feet x 11 ft. 9 in., and occupied nearly the whole of one side of the building. This contained twenty-two channels each 60 feet long and about 13 inches deep and 5½ inches wide. The fish ladder consisted of a tank 7 feet high and one foot by 3 feet in plan, which contained seventeen baffles placed 4 inches apart, the passing space between end of baffle and side of tank being 4 inches by 1 foot.



GENERAL PLAN OF MILWAUKEE EXPERIMENTAL FILTRATION PLANT

The "fall" consisted merely of a wooden box 4 feet x 4 feet in plan and 3 feet deep. Near the top and extending the whole width of one side was a receiving tray approximately 10 inches by 10 inches in cross section. The water and the coagulant solution spilled over the side of this tray onto an apron set at an angle of about 45 degrees which had two riffle strips 1 inch high extending across the entire width of the apron. The water fell from the apron onto a pile of stones with the idea of still further agitating the flow. The "flume" consisted of a trough or flume 28 feet long, 2 feet wide and 1 foot deep containing thirteen riffles 6 inches high and set 2 feet apart throughout the length of the flume. The flume was set at a slope such that the water had a total drop of about 4 feet.

Mr. Ellms placed considerable emphasis upon the importance of thoroughly mixing the coagulant with the water, and for this reason tried out the devices described above, which were all believed to be more or less novel and departures from existing practice. They are simpler and very much less expensive to construct than the mixing chamber ordinarily used for this purpose.

CHARACTERISTICS OF THE LAKE WATER

The water of Lake Michigan used by the city is unusually clear and cold, the average temperature being approximately 43 degrees and reaching a maximum of 74 degrees in summer. Considerable variations in temperature are noticed at short intervals of a few hours or even minutes

The average turbidity of the water was between six and seven parts per million, a maximum of 160 parts having occurred in March. The higher turbidities naturally occur after long-continued storms which set up currents that scour the bottom in the shallow portions of the lake. For long periods the water is exceptionally clear, although there is always a very slight turbidity due to small amounts of very fine silt. An examination of the silt settling out from the lake water showed 46.2 per cent passing a 200-mesh sieve and only 5.9 per cent additional passing a 100-mesh sieve. The balance or 47.9 per cent retained on the latter sieve consisted of ordinary lake sand. A considerable part of the turbidity is not included in this, being so fine that it was not deposited at all.

The mineral constituents of the water are more typical of a ground water than of a surface water. The organic constitutents were quite low and uniform in amount. On the whole, there is little information to be gained from the chemical analyses with reference to pollution of the water by sewage.

The average results of the analyses gave the following figures in parts per million: Total solids, 160; total hardness, 116; temporary hardness, 110; permanent hardness, 6; chlorides, 4; sulphates, 13.1; calcium, 35.3; magnesium, 11.7; free ammonia, .021; albuminoid ammonia, .078; nitrites, .003; nitrates, .05; oxygen consumed, 2.1.

The bacteria in the lake water were considered to furnish a better clue to the amount of pollution than did the chemical constituents. The number of bacteria grown on agar in 48 hours at 20 degrees C averaged less than 1,000 per c.c., but ranged from 7 to 48,000. The average B. coli index figure for the year was practically 10.00 per c.c. and the monthly averages varied from 1.62 to 19.61. These figures were considered to indicate unquestionably that the water entering the intake is at times badly polluted with sewage.

Practically all of the sewage of the city now discharges into the harbor, and the "North Point" intake is about 3.5 miles north of the harbor, while the Linwood Avenue intake is 1.5 miles further north. Studies were made of the effect of the winds in producing currents in the lake and the effect of such currents in carrying pollution from the harbor to the intakes. Studies were made with floats and otherwise and it was found that any air movements or variations in barometric pressures which tend to affect the lake level, or any flood conditions in the rivers which increase their hydraulic gradients cause more polluted water to be carried into the lake by these streams, and for the time being increase and widen the zone of pollution of the lake water. If, coincident with or following immediately after this, winds of proper velocity and duration cause the polluted water to be carried toward the intake, there exist all the conditions for a serious contamination of the water supply.

The report goes into this matter at considerable length and the conclusion is drawn that it is unmistakable that "if the water is not at all times dangerously polluted, it is so frequently contaminated that it is for all practical purposes a constant menace to the health of the city."

One of the features that received considerable study by Mr. Ellms was the existence in the water of a microscopic organism which seriously added to the difficulty of filtering the water by reducing the time for which the filters could be operated without washing. As warm weather approached, fishy odors were noted occasionally in the filter building, the cause for which was found to be the presence of microscopic plants. The diatoms were especially prominent, the Synedra being most numerous, but there also being considerable numbers of Asterionella, Diatoma and Tabellaria.

The conclusions from all of the investigations as to the quality of the lake water are summarized by Mr. Ellms as follows:

1. The water is for the most part fairly clear and cool. It may be, however, quite turbid at times, and cannot be called a clean water when judged by modern standards.

2. The water is moderately hard, but its hardness is practically all the so-called "temporary hardness," its "permanent hardness" being very low.

3. The water contains very little organic matter, but is infested with micro-organisms which, if of the right species and in sufficient number, may cause objectionable tastes and odors. These tastes and odors should not be confused with those due to industrial wastes in combination with chlorine used to disinfect the water supply.*

4. The water is polluted with sewage. This contamination of the intake water is intermittent, but nevertheless frequent. Judged by a tentative standard adopted by the International Joint Commission on the Pollution of Boundary

*Such a combination had caused very bad tastes in Milwaukee city water in 1918.

Waters between the United States and Canada, and having special reference to the permissible degree of pollution of the Detroit and Niagara rivers, the water now entering the waterworks intake is on an average twice as impure as it should be.

GENERAL CONCLUSIONS

The general conclusions from the entire investigation were that Lake Michigan offered the natural and only practicable source of water supply for Milwaukee; that it possessed several desirable physical and chemical properties, such as low temperature, comparative freedom from suspended matter and relatively little hardness. However, it is badly polluted by the sewage of the city and, from a sanitary standpoint, cannot be used unpurified without danger.

The city is making arrangements to purify its sewage, and this will probably ameliorate these conditions to some extent, but there is still remaining the pollution produced by the three rivers emptying into the bay, which rivers will receive overflow from the sewers during storms and the surface washing from communities along their banks.

Mr. Ellms quotes from the report of the advisory engineers to the International Joint Commission on the Pollution of Boundary Waters between the United States and Canada, as follows:

"While present information does not permit a definite limit of safe loading of a water purification plant to be established, it is our judgment that this limit is exceeded if the annual average number of B. coli in the water delivered to the plant is higher than about 500 per hundred c.c., or if in 0.1 c.c. samples of water B. coli is found 50 per cent of the time. With such limit the number of B. coil would be less than the figure given during a part of the year and would be exceeded during some periods."

The water entering the Linwood Avenue intake averaged 998 B. coli per hundred c.c., or practically twice the safe loading that a filter plant should be obliged to handle, and it would therefore appear that, even with the anticipated reduction in the pollution of the lake water, there are urgent reasons for undertaking its purification to safeguard the health of the city's water supply.

The experiments demonstrated that a filtration plant would remove all of the suspended clay and organic matter and 90 per cent of the bacteria, leaving on the average about 37 per cent of total bacteria of 1.6 as the index figure of B. coli. The tests on coagulation and filtration will be described in a following issue.

It was unnecessary to demonstrate the efficiency of chlorine for disinfecting the filter effluent, since this has been proved by several years of service. Test was made of a method and apparatus installed by a Milwaukee company for disinfecting by ozone. That ozone has the desired effect did not need demonstration, but the tests "show the apparatus for making the ozone to be of rather low efficiency and to possess only one or two features of especial merit over other apparatus previously produced. The compression of the air prior to its passage through the ozonizer is a good feature, as it avoids many difficulties arising from handling a corrosive gas through pumps or injectors. The ozonized air being under pressure, its application is more easily regulated than in suction apparatus. The tower method of applying the ozonized air is simple and can be made effective." Apparently the operation of the plant can be further improved. Losses of ozone were high, which increased the cost of the treatment. During part of the test a mechanical mixer or emulsifier was tried out, but appeared to offer no marked advantage over the towers except where room for the latter would not be available, while the power required to operate it might add considerably to the cost.

It appeared that this apparatus was still in the experimental stage for municipal water works purposes, and the cost of both the construction of the plant and the operation would greatly exceed that of chlorine.

(*To Be Continued*)

Fat Profits in Los Angeles' Garbage

The Pacific Reduction Company has made total profits during the past five years, from handling city garbage, of $73,153.80, of which $26,633.45 was paid out in dividends, according to figures contained in financial statements filed with the city auditor by general manager H. J. Murphy.

On motion of councilman Wheeler, the council passed a resolution asking the company to present its books for examination to show the profits it has made out of the sale of grease, fertilizer and other products manufactured from the garbage.

Preliminary examinations of the figures by chief accountant Francis Marshall of the city auditor's office showed that the company had made profits of $17,481,36 in 1916; a loss of $9.020.42 in 1917; a profit of $17,337.72 in 1918; a profit of $28,656.22 in 1919, in addition to paying dividends each year averaging $5,500, these dividends being charged to operating expenses, according to Mr. Marshall.

According to the figures submitted, the garbage disposal plant was valued at $363,295.98 on Jan. 1, 1916; and is now valued at $274,558.99.

Protest Against Builders Using Streets

Building contractors who, for the purpose of more effectively carrying on their work, have occasion to barricade sections of street and sidewalk adjacent to the sites where they are operating, should pay rent to the civic authorities for such space on the basis of so much per square foot per given time, in the opinion of the Civic League of Improvement Clubs and Associations of San Francisco. The league holds that they ought to be licensed to erect such barricades.

The secretary of the league, in behalf of that body, urged this in a letter to Supervisor William Stoddard Scott, chairman of the special license committee of the Biard of Supervisors. The letter carries also a protest against unnecessary occupancy of streets and sidewalks by contractors.

Constructing Water Supply Works of Winnipeg*

By W. G. Chase

Manufacturing concrete pipe and laying and backfilling same in tunnel. Study of effect of alkali soil on concrete. Efficiency of the excavating plant.

PIPE MANUFACTURE

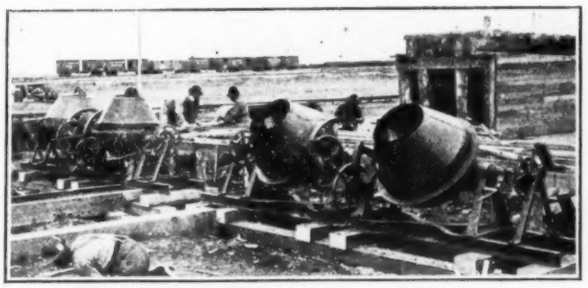
All this pipe was manufactured in a yard at Transcono, 1 mile north of the line of work, but convenient to railway tracks for the receipt of reinforcing steel and of cement. This yard was laid out as a double ended equipment and the longitudinal halves of the yard were duplicates in most particulars.

Eight Little Wonder concrete mixers served the yard and permitted the manufacture of an average of about thirty lengths of 66-inch pipe per day. The reinforcing mesh, delivered in 46-inch widths, and incidentally the heaviest mesh ever manufactured, was bent to shape in special rolls located on one side of the middle of each end of the yard. The square twisted steel bars used in manufacturing the interior cage or reinforcement were bent to shape and assembled in cages on the opposite point of the yards.

The pipes were cast within steel forms set up upon a double line of concrete bases reaching from end to end of the yard Provision was made for the admission of steam to and about these forms. After the pouring had been completed, steam was furnished from a boiler plant located in the middle of the yard.

The mixed concrete was transported from the mixers at the ends of the yard to the forms by means of a specially designed travelling derrick or crane whose outrigger arms supported conical concrete buckets which discharged through a plug valve in the bottom of the bucket on a circular disk set upon the inner form of the pipe. The pipe was cast spigot end upward, a special form being provided for the formation of

*Concluded from page 152.



MIXERS BEING INSTALLED AT TRANSCONA

the spigot and for the support of the copper water stop during the process of pouring.

Storage of the pipe after steam curing was provided along each side of the yard, the pipe being laid horizontally upon transverse runways. It was loaded for shipment upon cars spotted on tracks lining the outer edges of the storage yard.

RED RIVER TUNNEL CROSSING

The Red River is crossed with cast iron pipe 60 inches in diameter, set within vertical shafts lined with concrete, and within a concrete lined horizontal rock tunnel 10 feet square. Complete valve control is provided at each end.

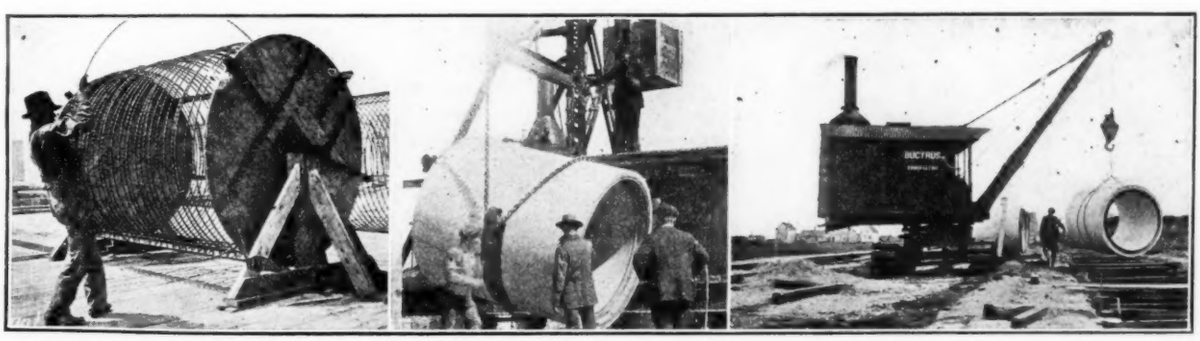
On the easterly end a reinforced concrete circular surge tank with concentric receiving tank was built, the whole being housed in for frost protection within a masonry shell. The construction of this work afforded very few difficulties.

One notable feature, however, was the manner adopted by the contractors for the support of the walls of the excavation for the receipt of the surge tank. The floor was about 20 feet below the surface of the ground. This support consisted of a fifteen-sided timber mitred framing without shoring, dressed with vertical sheeting. This arrangement gave clear access to the whole of the interior and was a perfectly safe protection for the 50-foot diameter of excavation. The well structure is supported on concrete piers sunk to rock.

CONCRETE LINING AND BACK FILL

The shaft lining, of 2-foot reinforced concrete circular wall, was shod with heavy steel plate and was built in sections as the lining was sunk by excavation from within; it proved easy to maintain this 16-foot shaft in vertical position on center.

The cast iron pipe lining of the tunnel proper was designed in 8-foot lengths with special interior joints caulked with lead wool.



ASSEMBLING REINFORCEMENT BAR CAGE

LIFTING AND TURNING PIPE

LOWERING PIPE INTO TRENCH

POURING TWO PIPES SIMULTANEOUSLY

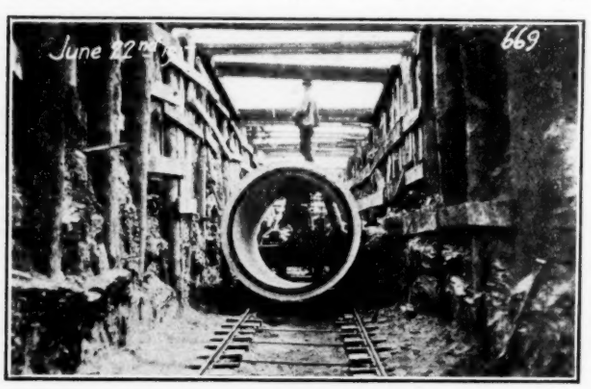
The backfilling of concrete around the pipe in the tunnel was done through tremies consisting of 4-inch well holes sunk from the surface of the ground or through the bed of the river as the case might be. At each stage 150-foot lengths of tunnel were refilled, concrete being built up to within about 1 foot of the roof of the tunnel excavation, and the remainder of the cavity being filled with mortar. The mortar was poured continuously down one tremie until it rose to at least river level in the other tremies entering the section. This insured the sealing of the tunnel solidly under heavy pressure.

CONCRETE IN "ALKALI" SOIL

This is a subject of vast importance to the municipalities and other owners of concrete structures throughout central Canada and central United States. The injurious elements found in the soils are the sulphates of metals as above listed and these sulphates in the presence of ground water attack the concrete from the outside, transforming it into a sulphate of calcium, destroying its cohesion and ultimately wrecking the structure.

Unfortunately this is proven from the experience of the cities of Winnipeg and St. Boniface with concrete sewers; of building owners with respect to foundations in Saskatoon, Moose Jaw, Winnipeg and other cities; and of course of irrigation projects who are losing their canal linings, their controlling works and their concrete siphons or pressure pipes.

The engineers of the Water District after 1916 took the precaution of providing underdrainage for the trench carrying the pressure pipes of the Red River Valley inverted siphon, as about that time it became evident that it is very doubtful whether Portland cement concrete of ordinary consistency, strength or density, porosity or permeability is safe against the attack of these ground water solutions of sulphate salts.



CARRYING PIPE INTO PLACE

A portion of the 100,000,000 gallon structure, that is between Miles 13 and 17, 96-inch diameter by 8-inch wall concrete pipe is now found to be suffering decay on its surface from these agencies and the Water District is engaged in a program of sub-soil drainage parallel to the conduit and reasonably close thereto, in the hope that this drainage by lowering the ground water plane between two such parallel drainage trenches will cause the action to cease.

Fortunately, the soils which contained these salts extend over a small area of the country crossed by this important water supply project and a system of ground water tests is being established so that the risk can be continually observed and necessary precaution can be taken from time to time.

EFFICIENCY OF EXCAVATION PLANT

The efficiency obtained with the machinery installed is indicated by a few records of earth excavation from the trench with the various classes of machinery engaged:

Type of machine	Capacity	Depth of cut	Material Excavated	Average Yardage Excavated 10-hour day
Marion Shovel	1½ cu. yd. dipper	12 ft.	Clay	612
Walking Dredge	1 cu. yd. dipper	8 ft.	Clay	745
Dragline	1 cu. yd. bucket	6 ft.	3 ft. peat, 3 ft. sandy clay	640
	1 cu. yd. bucket	7 ft. 5 in.	1 ft. top soil, 6 ft. 5 in. fine sand (wet)	740
	2 cu. yd. bucket	9 ft.	2 ft. peat, 3 ft. fine sand, 4 ft. sand and gravel	900
Bucyrus	2 cu. yd. bucket	14 ft.	12 ft. peat, 2 ft. clay in bottom of trench	1950
	3½ cu. yd. bucket	18 ft. 5 in.	6 ft. peat, 125 ft. clay	2920

A summary of the approximate quantities involved in the construction of the scheme: Earth excavation and backfill, 7,500,000 yards; rock excavation, 16,000 yards; concrete, 455,000 yards; reinforcing steel, 10,000 tons; Portland cement, 575,000 barrels.

Stream Pollution By Canton Sewage

Residents along Nimishilen creek, south of Canton, Ohio, have protested to the State Board of Health against the alleged pollution of the stream by Canton and a petition with 3,000 signatures has been filed with the board requesting the abatement by the board of the nuisance caused by the pollution. It is said that sewage is dumped into the creek by the city in such quantities as to be an intolerable nuisance; that flour mills using the stream for power have been forced to suspend operations because of the odor from the water, and that owners of land abutting upon the creek find sewage solids deposited along the banks to a considerable depth and emitting offensive odors. It is claimed that manufacturing plants and the city are both responsible for this condition.

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Refusing Priority to Water Purification Chemicals

Reference was made in PUBLIC WORKS a few weeks ago to the fact that priority rulings on freight have interfered with the delivery to cities of chemicals needed for purifying their water supplies. An instance of this is found in Richmond, Va., which a few days ago was almost entirely without alum and chlorine. The chemicals had been ordered weeks before but the railroads had side-tracked them and they could not be located. Warning was sent out by the directors of public utilities and public welfare that unless these chemicals were received within three days the supply would be entirely exhausted and the citizens should boil all water before using it. Efforts were made by city officials and the state Department of Health to have the chemicals delivered, but without effect. The citizens were warned to keep careful watch of the water and at the slightest indication of turbidity to accept this as a warning that purification of the water had ceased and to consider it as dangerous and boil it and take other appropriate precautions.

It is no exaggeration and is a statement which can be supported by numerous instances, that the delivering of unpurified water in cities where purification plants are regularly in operation, even if the purification ceases for only a day or two, may cause hundreds of cases and scores of deaths from typhoid fever. Considering the many cities and the millions of consumers that are now being supplied with filtered and chlorinated water, it is appalling to think of the possible and even probable consequences of any considerable percentage of these finding it impossible to obtain the chemicals needed for operating rapid filters or chlorinating plants. This might result in the deaths of hundreds and possibly of thousands from the epidemics of typhoid that would undoubtedly occur in many of the cities.

It is to be presumed that the United States Public Health Service presented these facts and arguments to those in charge of freight regulation in requesting that such chemicals be placed on the priority list. There are millions of tons of material on this list, the importance of most of which to the country is nothing like so great as that of these water purification chemicals, if the lives and health of the citizens are considered of first importance. If lives are lost through this refusal of Washington officials to do their part towards facilitating the delivery of these chemicals to the cities needing them, those officials could justly, in our opinion, be held morally responsible for these deaths.

An insignificant number of cars a day out of the many thousands which are used by the railroads would deliver all of the chlorine needed by all of the cities, and would handle all of the alum required. The transportation facilities required for this conservation of the health and lives of water consumers of the country would withdraw from the transportation of coal and other commodities on the priority list an unappreciable number of those being used for this purpose.

The only excuse that we think of as being offered by these officials is that, if they grant priority to these chemicals, it will be used as an argument by others in asking for similar favors. We think of few others which would have anything like equally strong arguments to offer; and if there are others with arguments as valid, they also should take precedence over coal, a considerable percentage of which is being used for the manufacture of nonessentials and luxuries.

Why Construction Lags

The long-suffering public is at present compelled to accept the conditions of unnecessarily scarce material and labor and excessive prices and in many cases is ready to pay the bills and even anxious to do so, in order to secure prompt construction to facilitate and increase industrial production and commerce.

The contractors are not put out of business by high prices or wages; they simply pass them along to the helpless owners—municipalities, individuals or corporations. So far as the government and some of the municipalities are concerned, the waste and extravagance incurred appears to matter not at all, or even to be desirable, because of the extra graft it affords to the venal politicians.

Notwithstanding all of these various difficulties, urgent and important construction and a large amount that is not vital would be progressing far more rapidly today and we would be much near an approach to resumption of normal conditions were it not for the unparalleled arrogance, unreliability and unfairness of labor unions. They are not generally amenable, as corporations, to civil processes, are generally entirely irresponsible, have the well-earned reputation of often breaking their covenants and have avowedly announced their policies of restricted labor, reduced production, excessive wages, and defiance of law without any apparent regard to the destruction of national reserves and resources that alone can supply the capital and equipment vital for sustained or increased production and prosperity.

Their motto is too often to force the last possible dollar from the public and their employers,

regardless of value exchanged, and to give the least possible labor in return for the highest wages that can be extorted, and above all, to secure universally closed-shop, preventing any independent workman from earning a living, which causes many unexcusible strikes, to say nothing of the numerous disputes between the unions themselves.

The whole subject was forcibly demonstrated by the statement only a few days ago by one of the heads of a large contracting firm of the highest standing for the excellence of its work, its reliability and the generous treatment that it gives its employes.

This firm has successfully executed a large amount of private and public construction, some of it of a very difficult nature in New York and vicinity, and has now under contract an important construction of which this representative said, "I am anxious on account of the labor question, which is very bad and getting worse. Men are difficult to obtain and we never know what they will demand or if we can keep them at any price. The unions are continually making trouble and calling off their men on the slightest pretext. The other day they were called off simply because someone disliked something about the wrecking crew that were removing the old structure. Another time it was because two different unions claimed the right to do work on the same scaffold, and we had to employ one union to build the lower part and another the upper part thus doubling the cost and time to avoid a strike.

"Such conditions make us refuse much work that is offered us and that we would otherwise wish to undertake. We do not at present want large jobs for a fixed or unit price, and are chiefly taking small jobs that can be completed quickly —say in 60 days."

In addition to the entirely unjustifiable and disproportionate high prices, we instance the case of a large apartment building in New York City which was commenced last year. After the steel framework costing perhaps several hundred thousand dollars had been erected, the labor unions stopped work on the building and would not permit it to be resumed because they had objections to the contractors that had fabricated or erected the steel framework and demanded that it should be entirely torn down at a cost of many thousands of dollars by union labor, and re-erected by satisfactory union labor before they would permit the building to be completed. The owners being unwilling or unable to comply, the building has remained for months in its unfinished condition entailing great losses to the innocent owners and to the public that suffer so acutely for housing today.

Under such conditions, when the owner and the builder are at the mercy of the highwaymen and there is little or no protection or legal redress, capital that is anxious to work will, and should be, kept idle rather than submit to such extortion.

Building Roadways In Half-Width Strips

One of the features connected with highway construction which causes the officials to be annoyed by general complaints is the apparent necessity of closing the roads during construction and compelling traffic to take detours meantime. The only practicable method suggested for avoiding this is to pave one side of the middle line of the road at a time, leaving the other half open for traffic. This, of course, has its objections, one of which is a greater or less increase in the cost of construction. Another advantage claimed for this procedure in the case of concrete roads is that it gives an expansion joint along the middle of the road, where cracks are quite apt to appear; which expansion joint, showing up prominently as a black line on the white surface, is claimed to tend to keep traffic on its own side of the road and thus reduce the number of accidents.

Theoretically this appears very attractive. Unfortunately it does always seem to work out so satisfactorily. The concrete road being built in this way which is described in this issue is an illustration. The conditions here are, of course, extreme. The road carries a very heavy traffic continuously night and day, and even the presence of state police, at each end of the section under construction, to control traffic is not always successful in preventing violation of the regulations and confusion and collisions occasionally. The half-width of the road is so narrow that two vehicles cannot possibly pass on it, and it is, therefore, necessary to allow those going in one direction to use the strip for two or three minutes, holding up those going in the opposite direction, then permitting these latter to use the strip while the other line waits. Where the vehicles pass only at intervals of five minutes or so the difficulty would not be anything like so great, especially if there were shoulders on which vehicles could pass when they meet in this narrow strip. In the road in question, however, not only was there continuous traffic in both directions, but nearly a quarter of a mile of the road was on an embankment, the guard fence along the edge of which was only a few inches from the edge of the roadway, and consequently it was absolutely impossible for vehicles to pass each other.

The argument that the expansion joint down the middle of the road would tend to keep traffic on the right hand side and thus minimize the danger of collisions, although it is reported to have had this effect in some cases, as described previously in Public Works, is said to have had no such effect on a road in eastern New York, where traffic is reported to pay no attention to the expansion joint considered as a traffic boundary, but to travel in the middle of this highway as they do in others. Owing to these experiences it is probable that no more roads will be built in this section of New York State by this method of building half-widths.

Cost of Construction Accidents

Discussion of life, time and money lost by accidents on construction work, cost figures in percentage which it is estimated can be reduced to one-half, making in wages alone, an average saving of $27,000 per year for a 3,000-man force.

In a recent article by F. A. Davidson published in the Westinghouse, Church, Kerr & Company quarterly, the cost of construction accidents is analyzed from the standpoint of the injured persons in capacity, suffering, expense and loss of wages; the loss of services to the company, the possible effect on the efficiency of the remaining workmen, the possible psychological effect of the accidents on the uninjured workmen, cost of training new men, and increase of insurance rates.

The records of the company for the first quarter of 1919, show that during that time 237 accidents occurred on all of the jobs in progress by the company. In 212 cases a doctor's services were required, and in 147 cases the workmen lost no time excepting the remainder of the day on which the accident occurred. The remaining 90 cases were called "Lost Time Accidents," in which the workmen were off duty after the day of the accident.

LOST TIME ACCIDENTS

The 90 Lost Time Accidents were divided as follows:—

The total working time lost due to these ninety accidents amounted, in addition to the one fatal accident, to a total of 1,734 working days equal to a loss of $9,775 in wages. Each 3,000 man-hours per year represents one full time worker. To calculate a yearly accident frequency rate for any particular concern, the total number of man-hours worked during the year is divided by 3,000, which gives the number of full time workers. Then, since the total number of accidents is known, it is possible to establish an accident frequency rate which is usually expressed in terms of the number of Lost Time accidents per thousand or per hundred full time workers. The accident severity rate is usually expressed in terms of the number of days lost per Full Time Worker. Based on the records for the first three months of this year W. C. K.'s accident frequency rate is 72 Lost Time accidents per year per 1,000 full time workers.

The severity rate based on the same period of time is 3.3 working days lost time per year per full time worker, exclusive of fatal accidents, of which there was one during the first quarter.

These actual figures may seem impressive to those who have never realized the extent of accidents in construction work. They are impressive and yet it is a fact, as testified to by such statistics as are available and by general observations, that W. C. K's accident rates are considerable below the average accident figures in the construction field.

LOSS AND RATE PER MAN-HOUR

Fatal	1
Permanent partial disability	1
Caused loss of time of two weeks and over	33
Caused loss of time from one to two weeks	16
Caused loss of time of less than one week	39
Total	90

The total number of man-hours worked on a job during a month divided by 250 gives the number of full time workers on the job for the month. The yearly frequency rate divided by 12 gives 14 Lost Time accidents per thousand, or 1.4 Lost Time accidents per thousand full time workers per month, which represents the monthly frequency rate. In the same manner the monthly severity rate is 0.28 working days lost per full time worker per month. On a job requiring an average of five hundred men for six months, on an eight-hour basis with no overtime, the number of man-hours worked per month would be approximately $500 \times 25 \times 8 = 100{,}000$ man-hours. This figure divided by 250 gives 400 full time workers per month. Applying the above rates to the assumed job, we obtain a total of 5.6 Lost Time accidents per month, with a resulting time loss of 112 working days. For the complete job lasting for a period of six months, the total accident cost will be 34 Lost Time accidents resulting in a total loss of working time of 672 working days, not including the loss of working time which would result from any fatal accident which might occur. It is certain that by earnest and sustained efforts on all jobs to prevent accidents the figures given above, which represent the present W. C. K. accident rates, can be cut in half.

ESTIMATE HELPS REDUCE ACCIDENTS

Consequently, in preparing an estimate of the cost in injured men to complete a job, the rate used should be taken as not more than half the present rates of 1.4 Lost Time accidents per hundred 250-hour workers per month with 0.28 working days lost time per 250-hour workers per month. Having established an estimate on this basis, all energies can be devoted to keeping the cost within the estimate.

Applying this plan to the job used in our illustration, it means that when the completed structures are turned over to the client there will have been saved at least seventeen Lost Time accidents and a proportionate saving of 336 working days, representing in wages saved almost $2,000. Yet this is but one average job. Provided that the same principle is applied on all of our work and it is possible to cut the present accidents rates in half, the saving in accidents in a year's time (assuming for example that there are employed during the year an average field force of 3,000 full time workers) would be about 258 lost time accidents and a proportionate saving of 4,950 working days, representing in wages saved more than $27,000, without taking into consideration any fatal accidents.

National Construction Questionnaire

Questions submitted to construction associations by Senate Committee and suggestions of the Associated General Contractors.

Just before adjournment the U. S. Senate passed resolution 350, introduced by senator Calder, providing for the appointment of a committee of five to inquire into the existing situation in relation to construction and to suggest measures for its stimulation and encouragement. The resources and opportunities of this committee make it possible for it to immensely benefit the construction interests of the country, and to help all American industry by formulating an adequate policy to meet this period of reconstruction. It provides definite leadership and authority that had previously been lacking and which should be supplemented by the coordination of every contractor, architect, engineer, manufacturer distributor, and workmen who should fully respond to all requests for information and assistance both as individuals and as associations.

The committee has issued a request to construction associations to transmit forthwith to them replies to the following questions:

1—What is your point of view regarding the condition of the general building industry today?

2—What is your opinon of the condition of the various classes of construction today, such as housing, commercial construction, highways, etc.?

3—What is the condition of your particular branch of the industry?

4—In case the situation is unfavorable in your line, please list the causes of this condition in the order of their importance.

5—What suggestions have you with regard to remedies for the above conditions?

The Associated General Contractors of America meeting in conference with about 30 other associating members of the national federation of construction, in Philadelpha, June 17, to consider the most effective cooperation with the senate's committee recommended to the latter consideration of special features as follows:

Transportation:

Priorities for materials for essential construction second only to food and fuel for essential industries during existence of shortage of transportation facilities.

Materials:

Full publicity of costs of construction materials.

Labor:

Positive encouragement of desirable immigration. Extension of Government aid to trade schools.

Finance:

Legislative measures such as equitable tax exemption, to make investment in construction attractive without further inflating the credits of the country.

In response to the request of the committee that the Associated General Contractors should aid them by giving specific information the association has issued to its members the following questionnaire that can properly be answered by any contractors or constructors regardless of their membership in the association.

QUESTIONNAIRE

1. Is your firm being held up at present in the execution of any contracts for buildings, highways, railroads, public works?

2. Does there exist a shortage of adequate construction in your locality for buildings (houses, industrial buildings, etc.) highways, railroads, public works?

To what extent? (Please be as specific as possible.)

3. Why? (Please explain as fully as possible the underlying causes of 1 and 2, including the relationship of any of the following to the present situation: Transportation, cost or shortage of materials, shortage of labor supply, high wages, strikes, finance.)

4. What effect has this shortage of construction had on the public? (Including relationship to rents, commodity prices, standards of living, etc.)

5. What has been done in your locality to remedy this situation?

6. What do you think of the means thus employed?

7. What do you think of the following suggestions as remedies for the present situation?

Transportation—Priorities for materials for essential construction second only to food and fuel for essential industries during existence of shortage of transportation facilities.

Materials—Full publicity of costs of production and distribution of construction materials.

Labor—Positive encouragement of desirable immigration; extension of Government aid to trade schools; Government machinery to settle labor disputes with power to enforce decisions; a national conference of construction employers and employees.

Finance—Legislative measures, such as equitable tax exemtion, to make investment in construction attractive without further inflating the credits of the country.

8. What other suggestions can the A. G. C. present to the Senate Committee on construction and Production?

New Municipal Piers for New York

The sinking fund commission of the City of New York has authorized expenditures for the replacement of thirty-two municipal piers and the construction of eighteen new ones on the lower part of Manhattan Island. The new piers will be from 900 to 1,000 feet long and from 100 to 150 feet in width.

The City of Davenport, Iowa, has recently created a city planning commission consisting of the mayor, the city attorney and twelve citizens.

Excavating by Power Under Building

A cellar was excavated under a completed five-story building, involving removing nearly twelve thousand cubic yards of earth.

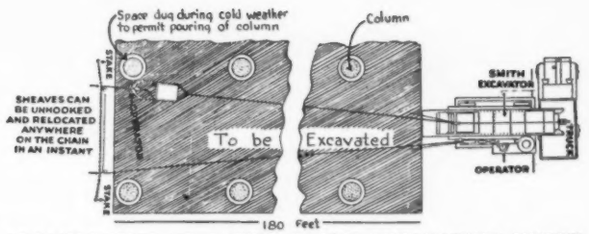
In the construction of the Wisconsin Food Products Company Factory at Milwaukee, the usual order of operations was reversed by building the 5-story factory first and afterwards making the cellar excavation of nearly 12,000 cubic yards of earth under the first floor of the building and around the foundations of the columns. Another novel feature of the work was that the soil was excavated, handled and loaded into trucks by a flexible power plant consisting essentially of a drag line scraper and hauling and excavating machine installed in successive positions so as to command all portions of the cellar area and deliver directly to the trucks by which the earth was removed.

When building operations were begun in November last, the ground was for a long time frozen so hard that excavation was difficult, slow and expensive. No attempts were made to complete the general excavation at this time, and, in order to avoid delay in the building construction, the sites of the column footings were located and defined, fires built on them and, after the ground had been sufficiently thawed, holes were dug just large enough and deep enough to provide for concreting the footings. After these had been finished the superstructure was built, with the 300 x 160-foot first floor less than five feet above the surface of the ground in some places.

As the outer walls of the building were not then completed below the first floor, the area to be excavated there was easily accessible and lighted from the exterior so that work could be carried on without much difficulty when the cold weather was over and the ground was soft enough to be handled advantageously.

As the headroom was not sufficient for handling even a small-size steam shovel satisfactorily, a Smith excavator and loader (such as was described in Public Works, May 15, page 433) was installed and executed the work rapidly and satisfactorily.

The plant installed has a drag line scraper, guided by hand and hauled back and forth by light steel cable operated by the drum of the loading machine, to which they were attached and to two tail sheaves adjustable at any points of an anchor chain set on the opposite side of the building from the loader and easily shifted

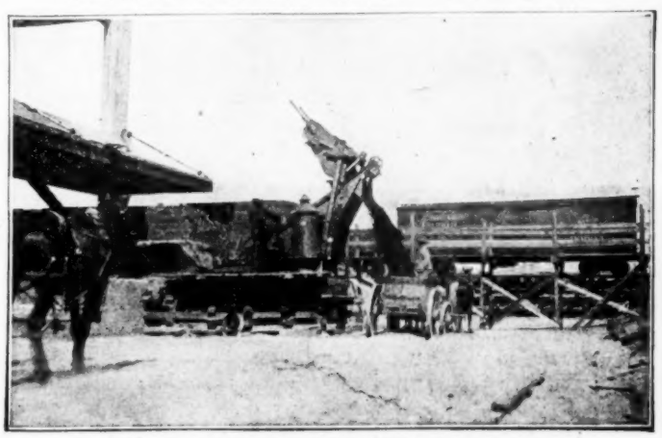

Space dug during cold weather to permit pouring of column
Column
SHEAVES CAN BE UNHOOKED AND RELOCATED ANYWHERE ON THE CHAIN IN AN INSTANT
To be
Excavated
SMITH EXCAVATOR
OPERATOR
180 Feet

ARRANGEMENT OF POWER PLANT EXCAVATING UNDER FINISHED BUILDING

from place to place so that the back and forth motion of the scraper commanded all parts of the cellar and easily worked between and around the foundation piers and columns.

The loader was set just outside the building on the center line between two rows of columns and was itself shifted from panel to panel as required. At the opposite end of the building, 180 feet away, the anchor chain, perpendicular to the column rows, was secured to two stakes about 20 feet apart, (on centers of column rows) and two sheaves or snatch blocks were hooked to it and shifted from time to time to vary the path of the scraper until the area between these two rows of columns had been excavated, after which

OPERATING DRAG LINE SCRAPER UNDER FLOOR



EXCAVATOR DUMPING CONTENTS OF DRAG LINE SCRAPER INTO TRUCK

the apparatus was moved to the next panel of the building and excavated it, and so on.

The loader was mounted on cribwork built up from the bottom of a depression in the surface of the ground about 6 feet below the basement floor. This machine had a platform carrying the hoisting engine, and an incline at the top of which there was a chute delivering into the trucks that were driven up alongside the machine. The scraper, being hauled up to the machine, was revolved upwards over the incline and reversed so as to dump into the chute, after which it was returned to the surface of the ground and drawn back by the tail line, ready for a new load. The apparatus was operated by two men and, although considerable time was lost because there were not enough trucks available to keep it busy, it handled an average of 30 cubic yards of spoil per hour. The excavation was done by the Water W. Oefleim Co. contractor.

Tunneling for a Culvert

A 30-inch culvert pipe 120 feet long and 14 feet below the surface of the ground was installed crossing at right angles under a railroad, two borrow pits and a highway in Stanislaus County, California, by the tunnelling method without disturbing the surface or interrupting the traffic at the intersections of the highway and railroad.

The pipe, for a portion of a syphon, was required to be watertight and is located below a hardpan stratum that doubtless facilitated the special method of construction adopted. Pits were excavated at both ends of the syphon and were drained by a 4-inch and a 2-inch centrifugal pump operated by a 2½ h.p. gas engine.

Armco corrugated pipe sections were riveted up at one end of the syphon to a length of 60 feet, placed in the required alignment and elevation and then forced longitudinally and horizontally under one borrow pit and the railroad track by one man excavating in the interior of the pipe and 4 assistants who removed the muck and operated a 50-ton jack by which the pipe was driven forward its full length.

In a similar manner a 40-foot length of corrugated pipe was driven in the opposite direction from the pit on the other end of the syphon and passed completely under the railway to a point within 20 feet of the forward end of the first pipe. The space between the two corrugated pipes was filled by five 4-foot lengths of concrete pipes 30 inches in diameter which together made a continuous horizontal section of syphon 120 feet long connecting at each end with a covered concrete well or manhole with a 30-inch pipe connection on the opposite side.

The tunnelling operations were completed in a day and a half without the interruption of traffic although as a precautionary measure, trains were slowed up during one day.

Nothwithstanding the friction and resistance developed by the exterior corrugated surface of the pipe, it was forced into position without serious difficulty and without causing any settlement in the railroad or highway. The work was executed under the direction of R. V. Neikle, chief engineer of the Curlock Irrigation District.

Isham Randolph

Isham Randolph, consulting engineer, died in Chicago, August 2. Mr. Randolph had been for 52 years in active engineering service, commencing as an axeman on railroad location and becoming successively resident engineer and construction engineer on several roads, chief engineer of the Chicago and Western Indiana Railway, chief engineer of construction of the Chicago, Madison and Northern Railway, and consulting engineer for various important corporations. He established an extensive consulting practice in Chicago, was one of the board of consulting engineers of the Panama Canal and chairman of the Internal Improvement Commission of Illinois.

He was for fourteen years chief engineer of the Sanitary District of Chicago, in charge of the famous thirty mile drainage canal the construction of which developed many new features of heavy engineering operations.

He was also consulting engineer for the Little river drainage district of Cape Girardeau, Missouri, and chairman of the Florida Everglades Engineering Commission. He was past president of the Western Society of Engineers.

Fred W. Gow

Fred W. Gow, a prominent waterworks builder, died at his home in Medford, Mass., July 28th, at the age of 56.

He had been connected with the Medford Water & Sewage Commission for 30 years, was made superintendent of the Medford Water & Sewage System in 1900, holding the position for 15 years and greatly improving it. From 1907 to 1915, he was a member of the Water & Sewage Board, being chairman for several years.

He was one of the members of the Charles R. Gow Construction Company, general contractors that built many of the largest filter beds and filtration plant in Massachusetts, including those at Lowell and Springfield. He was a member of the New England Waterworks Association and of the American Waterworks Association.

H. C. Ostermann

H. C. Ostermann, vice president and field secretary of the Lincoln Highway Association died suddenly, June 8, 1920. Mr. Ostermann was very prominent, efficient and enthusiastic in the promotion and construction of the 3,000 mile transcontinental Lincoln Highway and during his later years devoted himself exclusively to the great commercial achievement of creating an improved highway from the Atlantic to the Pacific.

Mr. Ostermann was born in Tell City, Indiana in 1876 and became self supporting at the age of 10. He enlisted in the U. S. Navy and after a varied and adventurous career, including practical railroad experience, entered commercial business in Chicago and after becoming inter-

ested in the automobile business in 1910 offered his services to the Lincoln Highway Association in 1913 since which time he has been prominently identified with it.

Highway Engineering and Transport Instruction

The University of Michigan, probably the only educational institution offering graduate short period courses arranged especially for men engaged in the practice of highway engineering and highway transport, has announced the following:

1920-1921 SCHEDULE OF GRADUATE SHORT PERIOD COURSES IN HIGHWAY ENGINEERING AND HIGHWAY TRANSPORT

DECEMBER 8 TO 21, 1920

C. E. 76. Highway Engineering, Theory, Design and Economics. Professor Blanchard.
C. E. 78. Grading Machinery and Operations. Professor Bateman.

DECEMBER 27, 1920 TO JANUARY 7, 1921

C. E. 67. Highway Transport Surveys. Professor Blanchard.
C. E. 71. Highway Specifications, Contracts, and Jurisprudence. Professor Riggs.

JANUARY 10 TO 21, 1921

C. E. 72. Earth, Sand-Clay, Gravel and Broken Stone Roads. Professor Bateman.
C. E. 81. American and English Highway Transport Methods. Professor Blanchard.

JANUARY 24 TO FEBRUARY 4, 1921

C. E. 68. Bituminous Surfaces and Bituminous Pavements. Professor Blanchard.
C. E. 74. Bituminous Materials. Professor Bateman.
C. E. 80. Interrelationship of Highway, Railway and Waterway Transport. Professor Riggs.

FEBRUARY 7 TO 18, 1921

M. E. 40. Mechanism, Operation and Maintenance of Motor Trucks, Tractors and Trailers. Professor Lay.
C. E. 69. Highway Laboratory Research. Professor Bateman.
C. E. 70. Highway Structures. Professor Gram.
C. E. 79. American and English Highway Traffic Legislation and Regulations. Professor Blanchard.

FEBRUARY 21 TO 25, 1921

Seventh Annual Michigan Conference on Highway Engineering.

FEBRUARY 28 TO MARCH 11, 1921

C. E. 73. Brick, Cement-Concrete, Sone Block and Wood Block Pavements. Professor Bateman.
C. E. 75. Highway Engineering Seminar. Professor Blanchard.
C. E. 82. Highway Transport Management, Costs and Record Systems. Professor Blanchard.

MARCH 14 TO 25, 1921

C. E. 77. Highway Engineering Financing, Administration, and organizations. Professor Blanchard.
C. E. 83. Highway Transport Seminar. Professor Blanchard.

Federal Aid Roads

The Chief of the Bureau of Public Roads, Thomas H. MacDonald, has recently stated that road operations under the Federal Aid Road Act thus far initiated totalled 29,319 miles, or nine times the distance from New York to San Francisco; also, that the federal government's share will cost more than the Panama Canal. Sixty per cent of the cost of roads which have been approved for federal aid will be spent for bituminous concrete, portland cement concrete and vitrified brick, the total of such roads approved for federal aid being 7,600 miles or more than half as much as the total milage of this class of roads in the United States before the federal aid road law was passed. The estimated cost of the approved projects is $384,900,000, and that of the projects already in various stages of construction or entirely completed is about $200,000,000.

Immigration Notes

The number of immigrants arriving at Ellis Island in the last week of July was only 10,615 as compared with 13,965 in the previous week, thus showing a drop of 3,310 which was partly due to the small number of large ships that landed passengers here during the week. A large proportion of the 1,132 steerage passengers on the Baltic were Irish girls and the majority of the 1,371 on the Moordam consisted of Jewish women and children freed from the Bolsheviki.

According to F. J. Raymond of the Inter-Racial Council, the number of the immigrants arriving in the United States since the armistice has exceeded the number of aliens departing by only 37,621, and in the year ending June 20 last, emigration exceeded immigration by more than 6,000. Last year 86 per cent of those who returned to Europe were able bodied men and only 76 per cent of the immigrants were producers. The male aliens who left the country last year each carried away an average amount of $3,100 which had been earned or accumulated in this country. It is, therefore, no wonder if foreigners are eager to emigrate and they should be assisted and encouraged, a necessity that is self-evident in view of the fact that more than 62 per cent of American labor is foreign born.

The general policy of daily papers throughout this country seems to be strongly in favor of encouraging an increasing labor immigration. One paper, quoting the Boston Transcript's estimates of 6,000,000 workers ready to leave Europe for America, immediately opportunity is afforded them, calls attention to the estimated shortage of 4,000,000 laborers that are now urgently required in this country, and deplores the restrictions that are imposed at both ends of the route. It concludes "that the future of American industry demands a clear admission of aliens; that none of the present restrictions, with the possible exception of the literacy test, should be modified until our quarantine stations are, beyond all hazards, able to guarantee the nation against the entrance of epidemic disease." This may well be supplemented by the further requirements that we shall be guaranteed against the admission of Bolshevists and other mischievous radicals.

The statement from Tacoma, Washington, that there has been definitely located an underground system on the Pacific Coast by which thousands of Japanese are smuggled into the United States yearly although perhaps not proven, is a positive indication of the fact that such labor is in demand, and will no doubt be used in a political argument in the campaign now being strongly maintained on the Pacific Coast to prevent the

entrance of Asiatics and especially to deny them the right of owning land in this country.

If the statements are proved that the Japanese employees in agricultural work almost invariably injure the land and reduce its production so as to depreciate the value and enable them to acquire title at a very small amount, after which they build it up for their own interest, some such restrictions may be proper, but it should be made without prejudice to the supply and employment of large numbers of laborers for agricultural and construction purposes.

The House Committee on Immigration and Naturalization has been in session for several weeks in California, Oregon and Washington and has received testimony that Japanese farmers in the state of California have increased from 4,500 in 1912 to 19,043 in 1918. Under proper restrictions these men are valuable farm laborers and a way should be found to utilize their services without lowering the standard of living, thus increasing the opportunities for skilled labor, without the drastic legislation intended to wholly prevent Japanese immigration.

If the United States does not take active measures to secure its share of the excess labor in European countries, especially in the war zone, it may find itself unable to secure even what it is willing to accept, for other countries welcome them more freely and have within recent years attracted large numbers. For instance, Brazil has received 1,015,883 immigrants during the twelve years ending with 1919, of which the largest number were Portugese, ex-Spanish, Italians and Russians.

Immigration for July

During the five weeks beginning June 25 and ending July 30, 1920, the total number of third-class passengers landing at Ellis Island was 84,492, and the number of third-class passengers departing was 63,219, an excess of 21,273 third-class passengers arriving.

It is estimated that approximately two-fifths of those arriving and one-third of those leaving are women and children. This would be equivalent to the arrival during this period of about 50,695 men, and a departure of 42,146, a net immigration of men amounting to 8,528, or at the rate of 1,700 per week. There is no present method of determining what proportion of these third-class passengers, going or coming, are citizens of the United States.

An Abundant Labor Supply

This country is conceded to be lacking 4,000,000 or 5,000,000 laborers, which even in the most favorable ante war times could not have been secured by immigration in less than four or five years and which would now require to be in excess of such immigration. It is important to note that there exists a great reservoir of competent and reliable cheap workers in Japan, where the population, which in 1915 was more than 55,000,000, had a density of 376 per square mile, much more than the principal European countries and already too great for the agricultural resources, only 35 per cent of the land being suitable for agricultural purposes. It is, therefore, necessary for Japan to find an outlet for a large number of her workers who, under proper restrictions, should be heartily welcomed here.

Plentiful Labor in Massachusetts

The officials of the eastern Massachusetts Street Railway Company, in opposing before the board of arbitration a wage increase demand by its employees, have established the fact that there is now in that locality a plentiful supply of labor, that its employes, some of whom have been working for the company from twenty to forty years, are generally in good circumstances, 147 of them owning automobiles and 23 per cent owning their own homes. Further, they state that during the last year, 10 of the divisions of the system have shown a deficit of $68,000 to $217,000 each, and only one, that of Fall River, has earned any net income. The road now has a fair schedule fully as high if not higher than other roads in that part of the country and has reached the maximum which the public will submit to. Therefore the company believes that no arbitrary increase of wages should be imposed but that the situation should be governed by the natural law of supply and demand.

Abundant Farm Labor in California

It is reported from San Francisco that abundant labor is available in California to harvest all crops and that agricultural wages are so high there that the net earnings of farm workers are greater than those of mill and factory workers.

It is further stated that in some industries production is smaller and increasing unemployment is tending to secure a resumption of the normal operation of demand and supply.

High farm wages are offset by high prices for farm products, but if the wages increase too high, the farmers are prepared, it is announced, to revert to grazing, thus diminishing their labor needs, giving their land a needed rest, and directly increasing the amount of labor available for construction purposes.

The Jeffersonville Municipal Fire Department threatens to go on strike unless its demands are granted for salary raise of $10 a month and four days off or $5 a month and eight days off. The city officials say that the municipal revenue will not permit the consideration of the firemen's demand. If the men can get more satisfactory employment elsewhere they should resign as fast as their places can be filled, but it should be unthinkable to have a possibility of a strike in the fire department that might subject the city to great danger.

Recent Legal Decisions

PROVISION REQUIRING ROAD TO BE KEPT IN REPAIR

Where a party contracts with a county to construct a certain road and to maintain it in a state of repair specified in the contract and for a period of time provided for in the contract, and fails to comply with the provisions of the contract as to maintaining the road in a state or repair, and the county is compelled, on his refusal to do so, to place it in a proper state of repair, the Oklahoma Supreme Court holds, Gibson v. Board of Commissioners of Okfuskee County, 189 Pac. 745, that the contractor and his bondsmen will be held liable for the cost of such repair, and where the verdict of the jury is reasonable, and it is reasonably supported by the evidence in the case, the verdict will not be disturbed on appeal.

WAIVER OF PROVISION TO GUARANTEE PAYMENT FOR LABOR AND MATERIALS

Where a contract for the construction of a school building expressly makes the specifications a part of the contract, a stipulation in the specifications requiring the contractor to give a bond guaranteeing payment for labor and materials is a part of the contract. But the school board may waive this provision and it is held, Builders' Material & Supply Co. v. J. B. Evans Const. Co., (Mo.) 221 S. W. 142, that a school board did waive such a provision by taking a bond which merely indemnified it against loss, damage, liens, etc., and that the surety on such bond was not liable to one furnishing materials to the contractor.

PROVISION FOR PAYMENT OF CLAIMS OF MATERIALMEN

The Ohio statute, section 1203, General Code, relating to the procurement of a bond by the state highway commissioners, contained two provisions, one mandatory, requiring a bond conditioned that the contractor should perform the terms of the contract; another permitting the inclusion therein of a provision for indemnity against liens and claims for material and labor furnished in the construction of the improvement.. The Ohio Supreme Court holds, State ex. rel. Marble Cliff Quarries Co. v. Watts, 126 N. E. 407, that these provisions of the act did not deprive the commission of the power to include in the bond a clause for the payment of claims accruing to materialmen and laborers on account of the construction of the improvement. Such included clause, since not prohibited, is justified, being within the purpose and scope of that provision of the act which permits the commissioner to include in the bond a provision for indemnity against liens and claims for material and labor furnished. It was developed in the record that a part of the material furnished the contractor by the Quarries Company for the construction of the road was diverted by the contractor to other purposes. The material so diverted was supplied to him "on account of the construction of said road," and the diversion neither relieved the contractor from his liability to the materialman nor the sureties from their liability for the payment of claims accruing in favor of such materialmen.

LIABILITY OF TOWN TO HIGHWAY CONTRACTORS

The New York Supreme Court, Special Term, Westchester County, holds, Coyne v. Town of Greenburgh, 110 Misc. (N. Y.) 598, 182 N. Y. Supp. 20, that under New York Laws 1892, c. 493, § 6, requiring avenue extension commissioners to ascertain the cost of opening, constructing and grading, and damages for lands taken, and providing that the amount "so ascertained" be paid by the town by the issuance of bonds, to be delivered to the commissioners, a town, issuing bonds and delivering them to the commissioners, thereby paid the amount "so ascertained", and was not liable to a contractor. The town was not required to pay to the contractors, but to deliver the bonds to the commissioners, whose duty it was to apply them in payment to the contractors.

IMPROVING ROADS "STRICTLY COUNTY PURPOSES"

The Washington Supreme Court holds, Rust v. Kitsap County, 189 Pas. 994, that whether a designated indebtedness is for a public purpose under article 8, section 6 of the state constitution is in each case a proposition finally to be determined by the courts and not the Legislature, though the legislature determination is entitled to great weight and will be upheld unless it plainly appears, beyond any reasonable doubt, to be mere pretence or dissimulation. A county was held to have the right to issue bonds for the purpose of constructing, repairing and improving roads within the 1½ per cent. limitation without authorization from the people under the Washington statute; such purposes being strictly county purposes within the constitution.

CONTRACT FOR CEMENT FOR HIGHWAY WITHOUT ADVERTISEMENT HELD VOID

The California Supreme Court holds, Henry Cowell Lime & Cement Co. v. Williams, 189 Pac. 838, that California St. 1913, p. 667, adding subdivisions 21 and 22 to section 4041 of the Political Code, and authorizing the employment of a purchasing agent to purchase certain county supplies and all other personal property or supplies, and providing that it shall not be necessary to advertise for bids for furnishing county supplies as required by section 4048, does not dispense with the advertisement for bids in purchasing cement for a highway improvement, as the clause "and all other supplies" is limited by the context to ordinary county supplies. Therefore a contract by a county purchasing agent for cement for a highway improvement which was made without advertising for bids in violation of the express requirement of the statute was held void, and the seller could not recover thereon.

NEWS OF THE SOCIETIES

August 24-26—LEAGUE OF CITIES OF THE THIRD CLASS IN PENNSYLVANIA. Annual convention York, Pa. Secretary, Fred H. Gates, Wilkes-Barre. Pa.

August 25-27—UNION OF NOVA SCOTIA MUNICIPALITIES. Annual convention August 25-27. Secretary, Arthur Roberts, Bridgewater, N. S.

Sept. 1-3—MICHIGAN STATE GOOD ROADS ASSOCIATION. Annual meeting, Lansing, Mich. President, P. T. Colgrove, Hastings, Mich.

Sept. 7-10—NEW ENGLAND WATER WORKS ASSOCIATION, Annual convention, Holyoke, Mass. Secretary, Frank J. Gifford, 715 Tremont Temple, Boston, Mass.

September 13-16—PACIFIC COAST ASSOCIATION OF FIRE CHIEFS. Annual convention Los Angeles, Cal. Secretary, H. W. Bringhurst, Seattle, Wash.

September 13-17—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting San Francisco, Cal. Secretary, A. W. Hedrich. 169 Massachusetts Ave., Boston, Mass.

Sept. 16-18—ENGINEERING INSTITUTE OF CANADA. Meeting to be neld at Niagara Falls, Ontario.

Sept. 20-23 — SOUTHWESTERN WATER WORKS ASSOCIATION, Annual convention, St. Charles Hotel New Orleans, La. Secretary, E. L. Fulkerson, Waco, Texas.

Oct. 12-14—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention. St. Louis, 401 Lincoln Avenue, Valparaiso, Ind.

October 13-15—AMERICAN CIVIC ASSOCIATION. Annual convention Amherst, Mass. Secretary, E. F. Marshall, Union Trust Bldg., Washington, D. C.

October 16-19—AMERICAN COUNTRY LIFE ASSOCIATION. Annual conference Springfield, Mass. President, Kenyon L. Butterfield, Amherst, Mass.

Oct. 19-22—INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS. 25th annual convention, New Orleans, La. Secretary, C. R. George, Houston, Texas.

GOOD ROADS MEETING IN NORTH CAROLINA

Representatives from twenty-six counties in North Carolina attended the first session of the citizens' mass meeting at Raleigh, Aug. 10, in the interest of good roads.

Following the address of welcome by Mayor T. B. Eldridge, of Raleigh, and the response of James Cowan, of Wilmington, substituting for Wade H. Phillips, of Lexington, who was reported absent because of bad roads, T. L. Kirkpatrick, of Charlotte, stated the object of the gathering.

Col. Kirpatrick declared that the idea upon which the meeting was grounded was to crystalize sentiment in favor of a state trunk system of modern highways, connecting every county seat in North Carolina. The convention was urged to adopt some measure with a view of placing North Carolina in the forefront of the other forty-seven states.

Special interest attached to the night session when rival gubernatorial nominees, Cameron Morrison, Democrat, and John J. Parker, Republican, spoke for good roads.

MATERIALS HANDLING SECTION OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

The largest and one of the oldest technical organizations of the country, The American Society of Mechanical Engineers, has formed a Materials Handling Section whose object is to "promote the art of the mechanical handling of all materials."

A meeting was held at the Engineering Societies Building, 29 West 39th St., at 2:30 P. M., August 13, 1920. Robert M. Gates, of the Lakewood Engineering Company, managing engineer specializing in material handling equipment, presided. The meeting was addressed by Harold V. Coes, industrial engineering specialist, of Ford, Bacon & Davis, F. M. Fieker, vice-president of the McGraw-Hill Publishing Co., and E. Logan Hill, formerly secretary of the Port and Harbor Facilities Commission of the U. S. Shipping Board, also formerly assistant general manager of the Erie Railroad.

Mr. Gates said: The soaring costs of today are not resulting alone in increase in the price of the commodity but are the results of increased costs of handling of production. The inefficiency of the freight handling system of these United States cannot be laid upon a lack of equipment but a lack of adequate means of loading or unloading and more effective means of filling cars to capacity and the providing of suitable warehouse facilities. These are acknowledged facts—facts that have been expressed and known for some time. We then ask ourselves what is being done to eliminate the difficulties. To date organizations and individuals have endeavored to encourage a correction of present conditions all with more or less beneficial effect, but so far there has been no common nationally known organization which all other institutions or individuals could turn to help correlate the effort on this subject.

There are but two ways of doing this work—manually and mechanically. The manual system can never be wholly dispensed with but it has been proven that it is utterly unable to cope with the situation. Therefore the salvation of our industrial and commercial life is dependent upon the development of the mechanical means of material handling and the fitting it into economic conditions of today.

THE NORTH CAROLINA SOCIETY OF ENGINEERS

The annual convention of the North Carolina Society of Engineers was held at Asheville, August 12-14th. Among the principal subjects considered was the passage of a bill by the next state legislature to secure the licensing of engineers and surveyors. A paper on this subject was presented by Chas. E. Waddell. Another paper on the State Water Resources was presented by Frederick W. Myers, and an excursion was made to the Pisgah National Forest.

AMERICAN ASSOCIATION OF ENGINEERS

The American Association of Engineers has inaugurated a 1920 membership campaign to extend from Sept. 15 to Oct. 30 and offers a large number of prizes ranging from a membership certificate to a gold watch or a life membership to those individuals which bring in the largest number of new members. Special rivalry has been developed between several important cities and it is expected that in New York City alone, the membership will be increased to 2,500.

The Illinois Assembly has been organized with 10 member chapters, Chicago, Danville, Decatur, Effingham, Joliet, Mattoon, Peoria, Rockford, Springfield, Rock Island. Robert C. Bruce of Joliet was elected president, Henry Riedl of Chicago, vice-president, Thomas E. Lowery of Springfield secretary, and E. H. Michaelis, Rock Island, Treasurer.

The Washington State Assembly will be permanently organized at a state convention to be held in Everett, Washington, on Aug. 24. A constitution will be adopted and permanent officers elected. The convention is expected to approve a proposed state license law which has been under preparation by the assembly license committee for several months. Courtland Penny is secretary of the assembly.

Chapter charters have been granted to members in Poughkeepsie, New York, and Jefferson City, Missouri, and a club charter in Rutland, Vermont.

The Chicago Chapter has requested the mayor of Chicago to remove from office Commissioner of Public Works Francis and the three members of the Chicago Civil Service Commission. This action was taken on August 6 as a result of the discharge from the employ of the city of Thomas G. Pihlfeldt, city bridge engineer for many years, and his assistant, Hugh E. Young, through a "trial" which the chapter characterizes as farcical and an exhibition of spoils politics. In commenting upon the chapter's warning to engineers against accepting positions in city employ, the Chicago Daily News says, editorially, "After the experience of Messrs. Pihlfeldt and Young that warning seems scarcely necessary. Engineers who have a regard for their personal reputations and professional standing will hardly choose to subject either to gratuitous attack by entering a service in which political influence apparently counts for very much more than does faithful work for the public."

DULUTH ENGINEERS' CLUB

At its meeting of Aug. 2nd, the Duluth Engineers' Club elected as officers; President. W. S. Hearld; first vice-president, O. B. Bjorge; second vice-president, Ray S. Huey; secretary, Geo. C. Olmsted; treasurer, A. U. Shipman; directors, A. M. Frazee, Frank Hutchinson, W. J. Mathews, Col. F. A. Pope; representative on the Minnesota Joint Engineering Board, W. H. Woodbury; delegate to Organization Committee of the Minnesota Federation of Engineers, J. L. Pickles.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

The 1920 annual meeting of The American Society of Mechanical Engineers will be held in the Engineering Society Building, 29 West 39th Street, New York City, from December 7 through December 10th. Sessions will be held on the subjects of appraisal and valuation and the application of engineering to woodworking.

The newly founded professional sections on management, power, fuels, machine shops, railroads and textiles will also conduct sessions to consider the vital problems in their field. In addition a number of valuable papers will be presented at General Sessions.

A memorial session for Dr. Brashear is planned, as a fitting tribute to his life and work.

BRANCHES OF ASSOCIATED GENERAL CONTRACTORS OF AMERICA

Oklahoma—Oklahoma City, Okla.

Officers: President, J. W. Maney Vice President, R. D. Farmer; Treasurer, M. A. Swatek; Secretary, R. G. Marriott.

Saint Joseph, Missouri.

Officers: President, P. P. Buddy; Vice President, Sam Hotchkiss; Treasurer, Chas P. Norris; Secretary, John H. Vincent, 717 Corby-Forsee Bldg., St. Joseph, Mo.

Southern California—Los Angeles, Cal.

Officers: President, Arthur Bent; Vice President, Clare L. Peck, of Leonard & Peck; Treasurer, J. F. Atkinson; Secretary, George A. Rogers, of Rogers Brothers Co.

Executive Committee: Arthur Bent, Clare L. Peck, George A. Rogers, Godfrey Edwards, R. F. Ware, J. C. Edwards and Frank Foell.

San Francisco, Cal.

Officers: President, Henry Jacks; 1st Vice President, John Biller; 2nd Vice President, P. J. Lynch; Treasurer, Charles Wright; Secretary, E. T. Thurston.

Directors: Henry Jacks, John Biller, P. J. Lynch, Thomas Elam, Charles Wright, C. M. Moore, A. H. Wilhelm.

Pacific Northwest—Portland, Oregon.

Officers: President, Natt McDougall, A. Guthrie & Co., Portland, Ore; Vice President, R. E. Miller, Puget Sound Bridge & Dredge Co., Seattle, Wash.; Secretary-Treasurer, I. N. Day, A. D. Kern & Co., Portland, Ore.; Executive Secretary, J. D. MacVicar.

Directors: Natt McDougall, R. E. Miller, I. N. Day, J. A. McEachern, D. G. Monro, General Construction Co., Spokane, Wash.; A. E. Griffin, Stewart & Welch, Vancouver, B. C.; G. W. Gauntlett, Grays Harbor Construction Co., Hoquiam, Wash.; Herman Goetz; A. H. Toole, Clifton, Applegate & Toole, Spokane, Wash.; K. B. Kumpe, Warren Construction Co., Portland, Ore.; Charles Swigert, Pacific Bridge Co., Portland, Ore.

Nashville, Tennessee.

Officers: President, J. W. N. Lee; Vice President, E. G. Holladay; Secretary, John A. Wilson, 177 Second Ave., N., Nashville, Tenn.

Northwestern, St Paul, Minnesota.

Officers: President, W. O. Winston, Winston Brothers Co., Minneapolis, Minn.; First Vice President, Charles Ffolliott, A. Guthrie and Co., St. Paul, Minn.; Second Vice President, H. N. Leighton, H. N. Leighton Co., Minneapolis, Minn.; Third Vice President, K. P. Grant, George J. Grant Construction Co., St. Paul, Minn.; Treasurer, Claude H. Siems, Siems, Helmers and Schaffner, St. Paul, Minn.; General Secretary, H. H. Weston.

Directors: T. J. Walsh, Walsh Construction Co., Davenport, Iowa; J. A. McEachern, J. A. McEachern and Co., Seattle, Wash; Nelson Story, Jr.; F. H Romer, F. J. Romer Construction Co., St. Paul, Minn., W. E. McCullogh and Cheney Co., Minneapolis, Minn.; M. W. Barnard, Minneapolis, Minn.; J. R. Stack, Stack Construction Co., Duluth, Minn., L. A. Baumgardner, L. A. Baumgardner and Co., St. Paul, Minn.; E. T. Foley, Foley Brothers Co., St. Paul, Minn.

ENGINEERING INSTITUTE OF CANADA

The next meeting of the Engineering Institute of Canada at Niagara Falls, Sept. 16, 17-18 will be devoted largely to papers on the new Chippewa-Queenstown development of the hydro-electric power commission of Ontario around Niagara and the Welland ship canals, both of which works will be visited by the delegates to the Convention.

CANADIAN POWER COMMISSION

A government commision to control water power in the province of New Brunswick, Canada, has been organized under the title of the New Brunswick Hydro-Electric Commission, E. O. Foss, St. John, chief engineer. The program includes the developments of two water powers for St. John and one for the North Shore.

PROBLEMS THAT CITIES ARE SOLVING WITH EXPERTS

The city council of Elgin, Ill., has engaged D. H. Maury, Chicago, to make a preliminary survey of the local water supply conditions

The Mayor of Philadelphia has appointed a zoning commission of 18 members including Geo. S. Webster, Chief of the Bureau of Survey; John A. Vogelson, Chief of the Bureau of Health and John B. Sinkler, city architect; Walter F. Ballinger, representing the Philadelphia Engineers Club and Edgar V. Seeler representing the American Institute of Architects. There are also representatives of the Master Builders Exchange and of the Central Labor Union.

A report on the water supply required for Philadelphia during the next 50 years is to be made by a commission of experts including J. Waldo Smith, George W. Fuller, J. W. Ledoux and Joseph F. Hasskarl who are expected to make a preliminary statement by September 15th.

PERSONALS

Holden, E. H., consulting engineer to the city of Yonkers, New York, and assistant engineer, Topographical Bureau, Borough of the Bronx, New York, died August 7th.

Sheppard, D. C., one of the contractors for the Great Northern & Pacific Railroads, died recently at St. Paul, Minnesota.

Helm, A. V., has been appointed resident engineer, Federal Aid Project 41, Franklin County, Kansas, headquarters at Ottawa, Kans.

Lenz, C. O., has been appointed consulting engineer to the Foundation Company, N. Y.

Atkins, Dudley, Jr., has been appointed resident engineer Federal Aid Project 53, Donaphan County, Kans., headquarters Troy, Kans.

Wilmot, Lieut. F. E., has been appointed resident engineer for the republic of Santo Domingo.

Davey, W. B., has been appointed city engineer, New Orleans.

Adams, Major F. P., has been appointed city engineer, Brantford, Ontario, Canada.

Simpson, Robert, has been appointed city engineer of Columbus, Ohio.

Anderson, W. E., has been appointed engineer of the Irrigation District, at San Benito, Texas.

McAdams, E. E., has been appointed city manager, Bryant, Texas.

Hines, Frank T., Brig-Gen., chief of the bureau of Transportation of the U. S. War Department, has been appointed head of the Inland and Coastwise Waterways Service.

Edwards, D. G., has been appointed director of construction of 1¼ miles of Intercontinental Construction in Brooklyn.

Kramer, X. A., has resigned as state engineer of Mississippi.

Cureton, Ralph, has opened an engineering office in Greenville, S. C., Mitchell, Gen. C. H., has been appointed member of the commission to investigate and report on the Ontario Hydro-radial system

Stephens, U., assistant bridge engineer of the Texas Highway Department has been appointed resident bridge engineer, Runnels County, Texas in charge of a bridge across the Colorado River near allinger, Texas.

Caven, F. H., has been appointed director of public works of Philadelphia.

Brown, Fred, has been appointed city engineer of Muskegon, Mich.

Davey, W. B., has been appointed city engineer of New Orleans, La.

W. A. Olen, president of the Four Wheel Drive Auto Company, with D. J. Rohrer and C. F. Folkman, members of the Board of Directors sailed for England, August 14th, in the interest of the company's foreign business

While abroad they will make a study of the truck situation with a view to improving present facilities of the company for handling its increasing export trade. The party will join Senator Anton Kuokuk, also a director, who is abroad at present.

New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations

HAND CUTTERS AND BENDERS

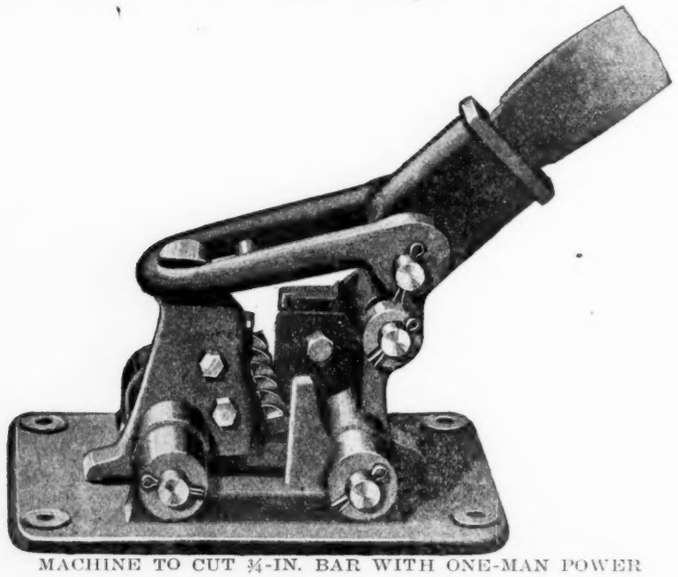
Catalog 22 of Koehring Machine Company illustrates two sizes of hand-power cutters for reinforcement bars. Size 1, weighing 100 pounds, will cut up to ¾-inch round or twisted bars; and size 2A weighing 70 pounds, will cut up to 1¼-inch round or 1⅛-inch twisted bars. Bars up to ¾-inch square can be cut by one man, larger sizes require two men.

The jaws are arranged so as to act more powerfully as the cut progresses and make a clean, square cut without fracture.

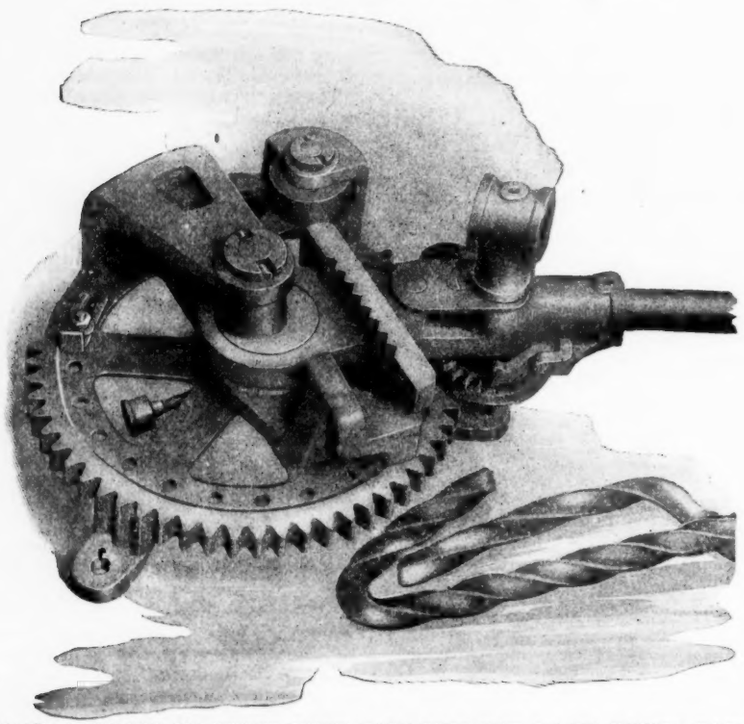
Hand-bending machines are also made in two sizes weighing 105 to 225 pounds without the handles, and with capacities up to 1¼ and 1½-inch diameter bars.

In the small size the die is 2 inches in diameter and has a roller bearing journal. The guide block has a large roller which reduces friction and permits the bar to follow freely.

The large machine has a die 3 inches in diameter and is provided with an adjustable clamp corresponding to the thickness of the bar. The pinion is provided with a ratchet lever and engages the gear segment on the main frame. If bars are bent too much they can be counterbent without removal from the machine and without making adjustments in it. For bars one inch or more in diameter, two men are required to operate the machine. The catalog contains convenient tables showing the widths, areas, and perimenters of round and square bars of comercial sizes from ⅛ to 2 inches.



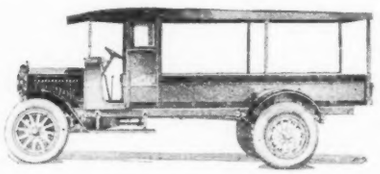
MACHINE TO CUT ¾-IN. BAR WITH ONE-MAN POWER



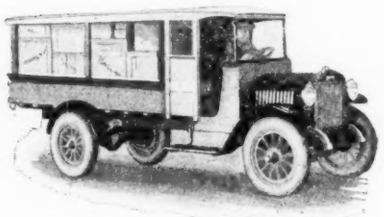
HAND BENDING MACHINE WITH CAPACITY FOR 1½-IN. ROUND BARS

DUPLEX LIMITED

The Duplex Truck Company has just put out on the market a new two-wheel drive type of machine known as the Duplex Limited and designed around pneumatic tires, which has unusual speed intended to fill the gap between strictly light delivery cars and slow speed trucks. It will safely and economically handle loads up to 5,000 pounds including body weight at the highest legal speed.



HIGH SPEED TRUCK



LIGHT DELIVERY CAR

It has a four cylinder, 25-h.p. engine, centrifugal pump water circulation, Duplex radiator supported on frames giving it a possible movement of 1-4 inch in any direction without compact, storage battery ignition, and electric starting and lighting.

Speed is obtained through motor power and not by low gear ratio; hence the adoption of a motor of exceptional power rating for a truck of its capacity. Gear ratio on high is in keeping with the motor power and maximum speed.

Both emergency and service brakes are of the internal expanding type on rear wheel drums. These are well proportioned, of ample capacity, and easily adjusted.